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ad-hoc Evangelist for

OPEN GL

VS

DIRECT X

Architect **Alex St. John**

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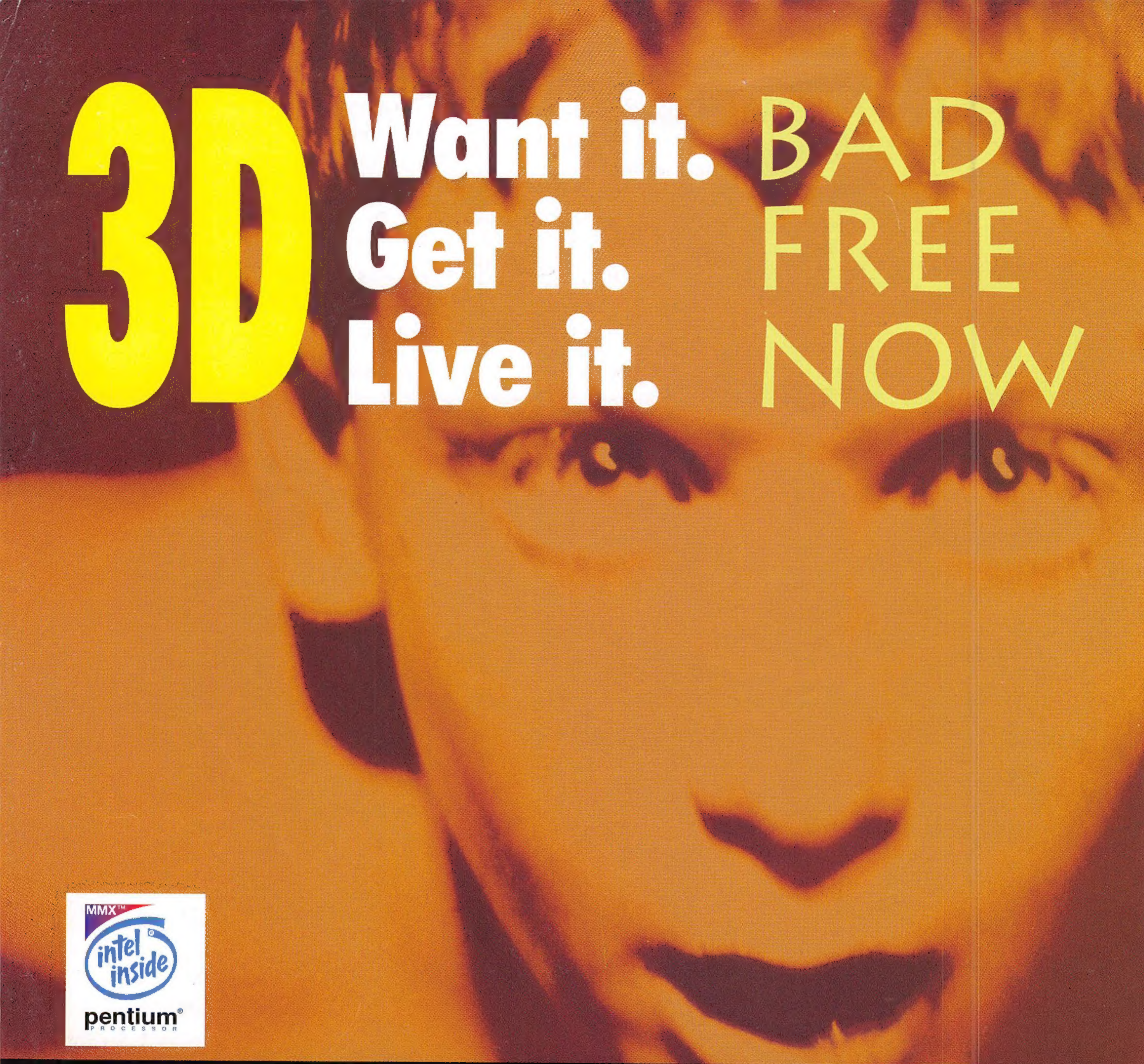

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ED WORD

*Software makes me **Hard***

First and foremost, *boot* is about the Pure PC Power hardware we all crave. So why do we review software? 'Cause even the burliest of muscle cars won't get you to Inspiration Point without a full-tank of gas. Same with your PC. Without the right bits doing the cha-cha on your hard drive, your dream machine is just a fantasy.

So what kinda software are we talkin' here? The kind that flexes your particular hardware. If you're packin' 3Dfx, you want an accelerated game that flashes framerates tettering on the triple digits. Sorry, but that vanilla-version of *Virtua Fighter* just ain't gonna cut it. If you've got AGP, you need *G-Police* or some other game that pumps hi-res texture maps that would bog down a lesser machine like cheddar through Al Bundy. And for that spiffy new DVD drive, you absolutely must have... well, trust us, we'll let you know if anything ever comes out for that white elephant.

Our hardware roots become apparent whenever you read one of our software reviews. We're not too terribly hung up on storyline (although we'll bag an RPG for a crappy one). Instead we focus on just how well the code shows off the machine running it. And vice versa. We want to experience a rush from any software we sacrifice hard disk space for.

And we aren't just talking games.

Creative software—such as music composition, image editing, 3D modeling and rendering—floats our boat, too. Recently, I took a trip to MetaCreations' offices down in sunny Santa Barbara to play with *Bryce 3D*, and it stirred more adrenaline in me than any action game I've played in quite awhile.

It just happens that games typically push the technological envelope a lot harder than office suites, so many of our software reviews do wind up being geared for those readers who want to meet fascinating new people on the Internet—and eviscerate them.

And multiplayer is just one of the criteria we look at. We want high polygon counts, lush hi-res textures, big-screen resolutions, rich color palettes, blazing framerates, responsive control, immersive sound, and AI that's smarter than your average ranger.

We don't just want this sort of power, we need it to survive.

Brad Dosland
Editor in Chief

NEWS

16 bootWire **News** that **matters**. With Intel **abandoning** Socket 7, AMD is stepping up its **assault** on the entrenched giant with a new wave of **uber-CPUs**: the K6+ 3D and the K6 3D MMX. With clock speeds up to **400MHz**, hardcoded **3D** processing, and **high-speed** cache sorting, they could be a force to be reckoned with. PLUS: A recent spate of technology **breakthroughs** promises to open up a **revolution** in chip fabrication that will change PCs **forever**.

VOICES

25 The Saint **Alex St. John** gets **hands-on** with the only **viable** content on the Internet: **Porn!**

27 Game Theory **T. Liam McDonald** looks at the **ethics** of computer game **journalism** and the people who **question** them.

29 On the Line **Shel Kimen** wants to know what's the **point** with What You See Is What You Get when what you get is **crap**.

31 Fast Forward **Tom Halfhill** stalks a **stealthy** startup whose **hybrid RISC/CISC** processor is quietly **competing** with Intel's offerings.

120 Glitch **Jon Phillips** uncovers the **dirty secrets** behind one of the cornerstones of computerdom in the **DirectTex files**.

DEPARTMENTS

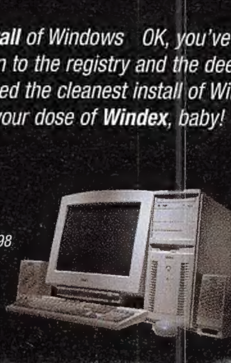
5 Comm Port Readers air out the **buzz** via e-mail, fax, and postcards from panda bears.

13 bootDisc Your guide to the **joys** of our shiny silver platter. This month: Exclusive 3Dfx screen savers, Jedi Knight, Age of Empires, Hexen II, Terracide, *and more!*

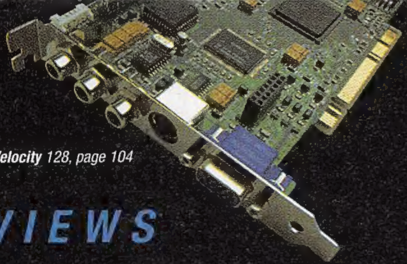
22 Pure Lust Tech toys for **digital** girls and boys.

72 bootWorthy: Games Following **hot on the heels** of the Lust List feature, the boot editors declare their **love** for the **best** games of 1997.

76 12-Step **Clean Install** of Windows OK, you've **fried** your system. **Deep fried**, down to the registry and the deepest **bowels** of Win95. Now you need the cleanest install of Windows humanly **possible** and we're your dose of **Windex**, baby!



Dell **Dimension** XPS D300, page 98



STB **Velocity** 128, page 104

CONTENT

P/REVIEWS

84 Previews *This month,* ***mega-sexy*** *games on parade, including* **Incoming**, **Battlezone**, **SiN**, *and* **Joint Strike Fighters**.

95 Reviews *After month's of drought, a* ***flood of A-titles*** *have taken over the bootLabs, but we are* ***prepared****. We've got our systems* ***armed to the teeth*** *and ready to take on all comers.*

ALSO:

- *A strong system from Dell makes a* ***mockery*** *of the bootMarks.*
- *Toshiba's mighty* ***mite*** *Portege take its show on the road.*
- *A slew of* ***3Dfx****-based cards show off how the* ***best*** *just keep getting better.*
- *And new 3D accelerators from* ***nVidia****,* ***ATI****, and* ***Matrox*** *go to bat.*

FEATURES

58 1997 LUST LIST

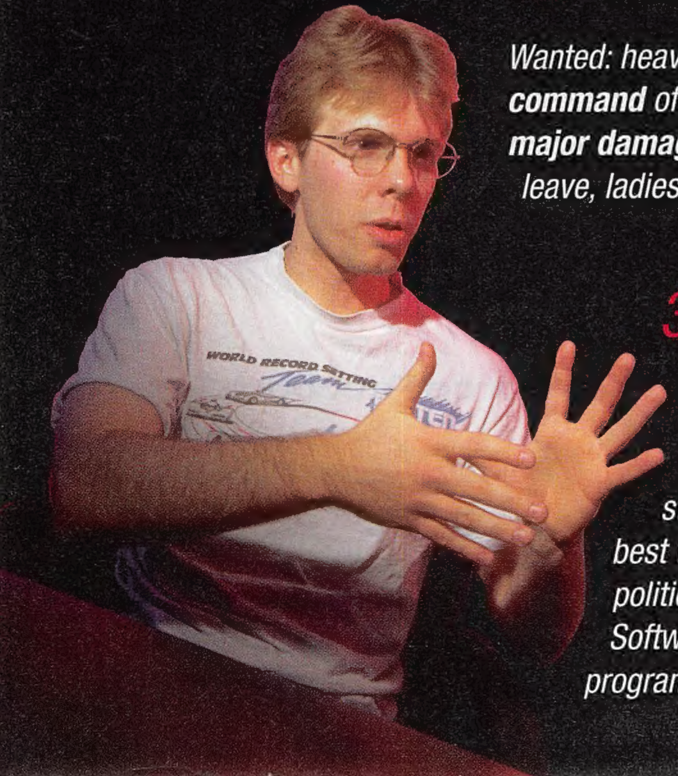
Forgive me father for I have ***sinned****: I* ***lusted*** *for* ***Pure PC Power*** *without enough jingle in my piggy bank! Systems, monitors, 3D cards, and more!* ***Ten*** *boot editors pick the* ***50 best PC products of 1997.***

56 DVD: Hardware's here, but Where's the Software?

We've reviewed ***DVD-ROM*** *systems and upgrade kits* ***a-plenty****—but where are all the DVD-ROM* ***games*** *with gigantic texture libraries and elaborate MPEG2 video?* boot ***investigates*** *the whole* ***sordid mess*** *in its second annual State of the DVD-ROM Union Address.*

43 This Means War

Wanted: heavily armed mercenary to assume ***command*** *of sprite-based army and inflict* ***major damage*** *on enemy petards. This isn't shore leave, ladies, this is* ***real-time strategy gaming!*** *Ah-forward, march!*



34 Lip: id Software's John Carmack and Brian Hook

boot *columnist* ***Alex St. John*** *traveled to the Lone Star state to talk APIs, software patents, 3D hardware, the best talents in the game industry, the volatility of plan files, politics, ethics, and the future of SGI's OpenGL with id Software's* ***John Carmack*** *and outspoken* Quake II *programmer* ***Brian Hook****.*

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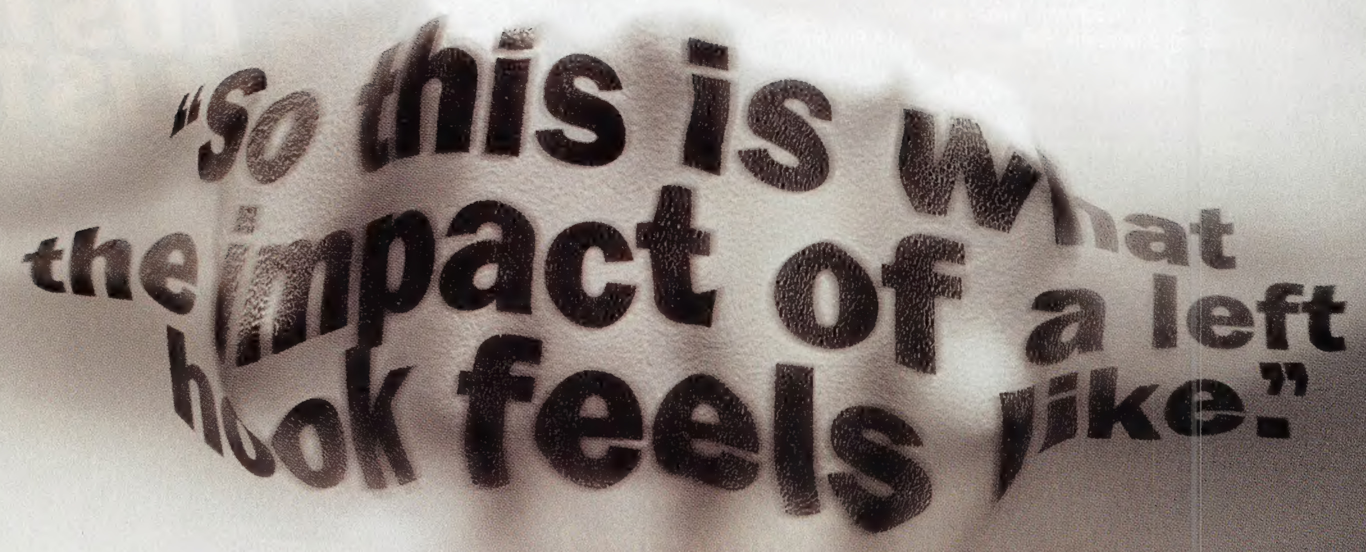

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IMAGINE PUBLISHING INC
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INTERNATIONAL LICENSING REPRESENTATIVE
Robert J. Abramson and Associates, Inc.
720 Post Road, Scarsdale, NY 10583

volume 2, issue 10

boot *(ISSN 1088-5439) is published monthly by Imagine Publishing, Inc., 150 North Hill Drive, Suite 40, Brisbane, CA 94005, USA. Periodical class postage paid in Brisbane, CA and at additional mailing offices. Newsstand distribution is handled by Curtis Circulation Company. Basic subscription rates: one year (12 issues) U.S.* ***$39.90****/Canada* ***$53.90*** *Canadian price includes postage and GST (GST #128220688).* ***POSTMASTER*** *Send changes of address to* **boot**, *P.O.Box 51479, Boulder, CO 80328-1479.*

Bulk Rate, U.S. Postage Paid, Waseca, MN, Permit No. 350

Standard Mail enclosed in the following editions: A3, B, B1, B2.

CPC Int'l Pub Mail # 0781029. Outside the U.S. and Canada, price is $53.95, U.S. pre-paid funds only. For customer service, write **boot**, *P.O. Box 51479, Boulder, CO 80328-1479;* **boot**, *150 North Hill Drive, Brisbane, CA 94005. Imagine Publishing also publishes* PC Gamer, Next Generation, Mac Addict, Ultra Game Players, PlayStation Magazine, *and* The Net. *Entire contents copyright 1997, Imagine Publishing, Inc. All rights reserved. Reproduction in whole or in part is prohibited. Imagine Publishing, Inc. is not affiliated with the companies or products covered in* **boot**. *PRODUCED IN THE UNITED STATES OF AMERICA.*

COMM PORT

Untouchable

boot is the first real magazine that appears to be the perfect PC geek magazine. The coverage is great, the articles are exactly what I've been wanting to read and the vocabulary makes me feel like the writers are just some of the boyz. That's what sets *boot* apart from all the Ziff Davis-type PC*.* clones out there. They're all tight-ass magz that read like they were written by CEOs at Intel or other overly aggressive, anti-trusting, brainwashing, consumer-deceiving, greedy-ass, monopolistic corporations.

That leads to my point: the remote, but entirely possible, chance that *boot* could be tainted with partiality. I see that *boot* really likes products (and, I can't blame anyone for that), but hey, what a surprise, 3Dfx happens to be a sponsor according to the web page. So, why the hell should I subscribe to a magazine that reads so well, but has one of the tell-tale signs of corruption (specifically, opinions that have been paid for through advertising). I really like your magazine, but please convince me that you guyz are impenetrable to temptations of kickbacks, and that my pursuit of perfection of literature is over.

Mike Ryan

Editor in Chief Brad Dosland replies: *Didja ever see that movie "The Untouchables"? Well, that's us. And I can personally guarantee that* boot*'s content will never be tainted by an advertiser.*

In fact, the biggest risk boot *faces is the companies who are scared away by* boot*'s blatantly frank approach to the PC industry. They don't advertise and they refuse to send us product to scrutinize and put to the test. I'm amazed that a simple virtue like honesty could scare so many people and make a magazine controversial.*

We like 3Dfx because it's the best 3D card currently available. Period. Best performance, best support, best variety. 3Dfx's decision to advertise on boot*'s web site is probably driven by a desire to be affiliated with a like-quality product...* boot*!*

Thanx for caring about the truth and asking!

Who the hell is Optiquest?

I always enjoy your reviews, interviews, new product updates, and general hands-on approach with the bleeding-edge of PCs, but you should do a long-term study of some of the Kick Ass products you endorse. In question, with regards to your Dream Machine (*boot* 13), who the hell is Optiquest? You never mention the warranty on this so-called bitchin' monitor, anyway. How long is the turn-around time? Does the consumer pay for shipping? This great price could be a Trojan horse because of DOAs, slow customer response, and general BS due to the incompetence of the manufacturer.

Robert E. Dier

Executive Editor Jon Phillips replies: *Optiquest is the consumer-market subsidiary of ViewSonic, that well-respected manufacturer of professional displays. The Optiquest V95 comes with a three-year warranty for CRT and parts, and a one-year warranty for labor. Optiquest pays for shipping, and even sends you a loaner (free of charge) within 48 hours. In short, you get the full ViewSonic warranty plan.* boot *does all it can to alert readers to fly-by-night companies, but we can't do the job alone. Keep us informed, bootPatrol!*

High on Octane

Way to go for reviewing SGI hardware! The O2 is the blue toaster with the mostest! Sure, it's expensive, but hey... You get what you pay for. The beauty with SGI is that there is always more power to be obtained. The O2 is just the entry level; you can keep going until you get the RealityMonster. I just think SGI makes the best computers in the world. Plain. Simple. End of Story. Now review an Octane.

Travis Braddy

Calling Bunk on Dunphy

I was reading the 12-Step/Clinic section when I noticed the following statement: "Intel told us 640K was more than we would ever need."

Normally I don't ***question*** *Mr.* ***Dunphy****, but wasn't it in fact* ***Microsoft****, not* ***Intel****, who was* ***responsible*** *for the* ***infamous*** *640K limit.*

Normally I don't question Mr. Dunphy, but wasn't it in fact Microsoft, not Intel, who was responsible for the infamous 640K limit, which magically disappeared when running UNIX or another non-DOS-compatible OS on x86 machines? According to my "Pocket PCRef," even the 8086/8088 were capable of addressing 1MB of physical memory and the 286 could address 16MB. All those goofy workarounds (XMS, EMS) were/are ways to get around OS limitations, not hardware.

Jason Montoya

Tech Editor Chris Dunphy replies: *I blame the debacle both on Intel and Microsoft. Intel's initial architecture only allowed 1MB of memory space. Microsoft made reasonable assumptions about how to divide up that space, thus giving us the 640K limit. Neither of them thought ahead to make extending to larger memory models easier. The memory system used on the 286 was an improvement, but it was tacked on in a way that made apps written for the simpler model incompatible unless gross hacks were undertaken. Every new DOS release had to remain compatible with older releases, and thus the 640K limit could never be removed. Yuck.*

Compare all this mess to the evolution of the Motorola 68K line of processors. They were designed with a 32-bit memory address space from the start, and have been able to scale to tons of

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RAM with ease. It just goes to show you how better designs don't always win.

Earache my PCI!

Which do you think is better: The Diamond Monster Sound or the Creative Labs' Sound Blaster AWE64 Gold? Can the two be used together without losing functionality?

Matt Johnson

News Editor Bryan Del Rizzo replies: *Another apples and oranges question! But if I had to choose right this second, I'd have to go with the AWE64, even though I prefer the MonsterSound's functionality and performance.*

Why? Since the accelerated gameport on the MonsterSound doesn't work with any digital joysticks, you'll have to plug in a regular old sound card or gameport. And if you're going to all that trouble, you may as well just stick in the AWE64 (even if it is ISA-based and consumes too many clock cycles).

However, overall, I prefer the MonsterSound due to its PCI-based architecture, wavetable quality, and its support of up to 24 independent 44kHz audio streams. DOS is dead, and I could care less about Sound Blaster legacy support. Bring on DirectSound 3D (and a fix for that damned gameport).

3D Card Collusion

There's a collusion between the hardware makers and the software makers, and none of it is for the good of the shopper.

There's a difference between upgrading technology to make software run better and just coming up with things so people are forced to buy new ones. This 3Dfx is the biggest sham! These hardware freaks are telling the software people, "Hey! If you make your game so it only works with our stuff, we'll give you a cut of the action." My ass! *Shadows of the Empire* is a perfect example. There's no reason a Matrox Mystique can't run this game and run it well. Sure, you won't get those nifty shadows like on the 3Dfx, but it could still run it. But do the software people let you? Noooo! They say you must have this, that, or the other. Bullshit! It makes absolutely no sense to cut off a large portion of your customer base. That is exactly what these software makers are doing when they make 3Dfx-only games. They're limiting their market. And the only way I can see them making money out of this sorry situation is that they are in collusion with the video card makers to push certain cards and get a slice of the take.

Paul Silverstein

The Hangar Next Door

I just want to ask a very simple question. Where do you store Alex St. John's ego at night? It seems you'd need quite a large open space to put that mother down. The "Saint"? I think not. He's more like a guy who worked for the Empire doing PR for the Death Star. And now that it blew up, he sits around and says, "Hey, I never really liked working for them anyway."

George B. Hardy

Tyan Me Up, Tyan Me Down

Please consider tech support as you rate products. In particular, you have consistently rated Tyan products highly, even though their customer relations stinks.

I bought a Tyan S1572 ATX four months ago. Tyan's web pages say how very wonderful their bus-master drivers are, how they enhance performance, etc. so I decided to give them a try. Three re-installs of Win95B later, I finally had the system working again—it seems that the upgrade couldn't handle my sound card's IDE controller (I don't have a free IRQ, and therefore disable it in device manager). I was very annoyed that this bug wasn't mentioned in any of the documentation. Also, the upgrade stopped my internal IDE zip drive from working properly. I had to reboot every time I changed disks.

And the power management never worked.

There's no ***reason*** *a Matrox Mystique* ***can't*** *run this game and run it* ***well****.*

These problems aren't addressed anywhere on Tyan's web page. Tyan believes you should get support through your retailer, but my retailer didn't have a clue what I meant when I said I wanted an ATX TX chipset motherboard. I had to bring in pictures from the Internet, for god's sake, and they're gonna help on this?

At the time, Tyan was not providing tech support through email. But I tried emailing other addresses at Tyan, pleading for help. I was ignored. I tried their tech support number many times, left several messages, and was ignored. Finally I tried faxing my questions, and was ignored. I sensed a pattern.

I painfully removed the drivers (their uninstall routine failed—what a surprise). They still push this driver on their page.

About two weeks ago, I noticed Tyan's email address for tech support was open again, so I asked about my power management problem... and was ignored.

I believe the new BIOS revision could help (Tyan doesn't bother to describe what has been changed), but their BIOS updates page says: "Please be aware that by downloading this BIOS you agree that in the event of a BIOS flash failure, you must contact your dealer for a replacement BIOS. There are no exceptions. Tyan does not have a policy of replacing BIOS chips directly with end users. Flashing a BIOS should only be attempted by a qualified technician. BIOS Updates are provided for evaluation purposes only."

Now, knowing the quality of other things offered on their web page, and knowing my dealer, what should I do? I will probably try it, and probably regret it.

Jeremy Lang

Don Clegg, Tyan's Vice-President of Marketing, replies: *Whenever you combine hardware and software components from several vendors, it's not always a trivial task to pinpoint the root cause of any anomaly. It sounds like this may be the situation in Mr. Lang's system—i.e., an audio card's IDE port may be in conflict with the secondary channel on the motherboard and should therefore be disabled (regardless of the busmaster drivers). We'll help him resolve the problem.*

In any case, I think the "real issue" centers around the frustration and sense of helplessness one feels when dealing with nameless corporations. We've all been there before, and Tyan is committed to customer responsiveness.

Tyan's taken significant measures in the last several months to enhance its technical support responsiveness. For instance, all email inquiries were previously routed to a general mailbox (TYAN@info.com). Now, however, technical support emails are handled exclusively by our Customer Support group at Techsupport@TYAN.com. It may be that Mr. Lang was sending emails to the general info.com address. In addition, we have recently added additional staff members to Technical Support Department phone lines so that all calls are returned within 48 hours. Our internal goal is "same day service" for all calls (we carefully track this metric).

Additionally, our web page at Tyan.com is continually updated to add new FAQs, product specs and other pertinent information. I encourage everyone to see for themselves at ***www.Tyan.com****.*

In summary, we regret any inconveniences experienced by Mr. Lang and we are committed to resolving his issues (our Manager of Technical Support will call him personally). As we grow, we'll continue to invest in our customer support infrastructure because we realize that a great deal of our business comes from satisfied repeat customers.

Only Our Barber Knows for Sure

I love your magazine, but I must confess I'm having a really hard time with the photos of the staff on **www.bootnet.com/staff.html**. I was raised to steer clear of people with mustaches, as well as that popular Canadian hockey player haircut—the "Mullet cut," or aka "Sh-Long" (short in the front, long in the back). Can you please reassure me that *boot* is still a magazine I can trust?

Chris

Executive Editor Jon Phillips replies: *We agree with all your points. Men who wear mustaches without beards remind us of Mark Spitz, a particularly distasteful fellow. And the mullet cut—we actually prefer the term "shaven duckwipe"—evokes imagery of that ill-fated and talentless 80s band Loverboy, and, perhaps more noteworthy from an anthropological standpoint, an emerging class of professional female golfers. Please go back to the bootNet and check out our*

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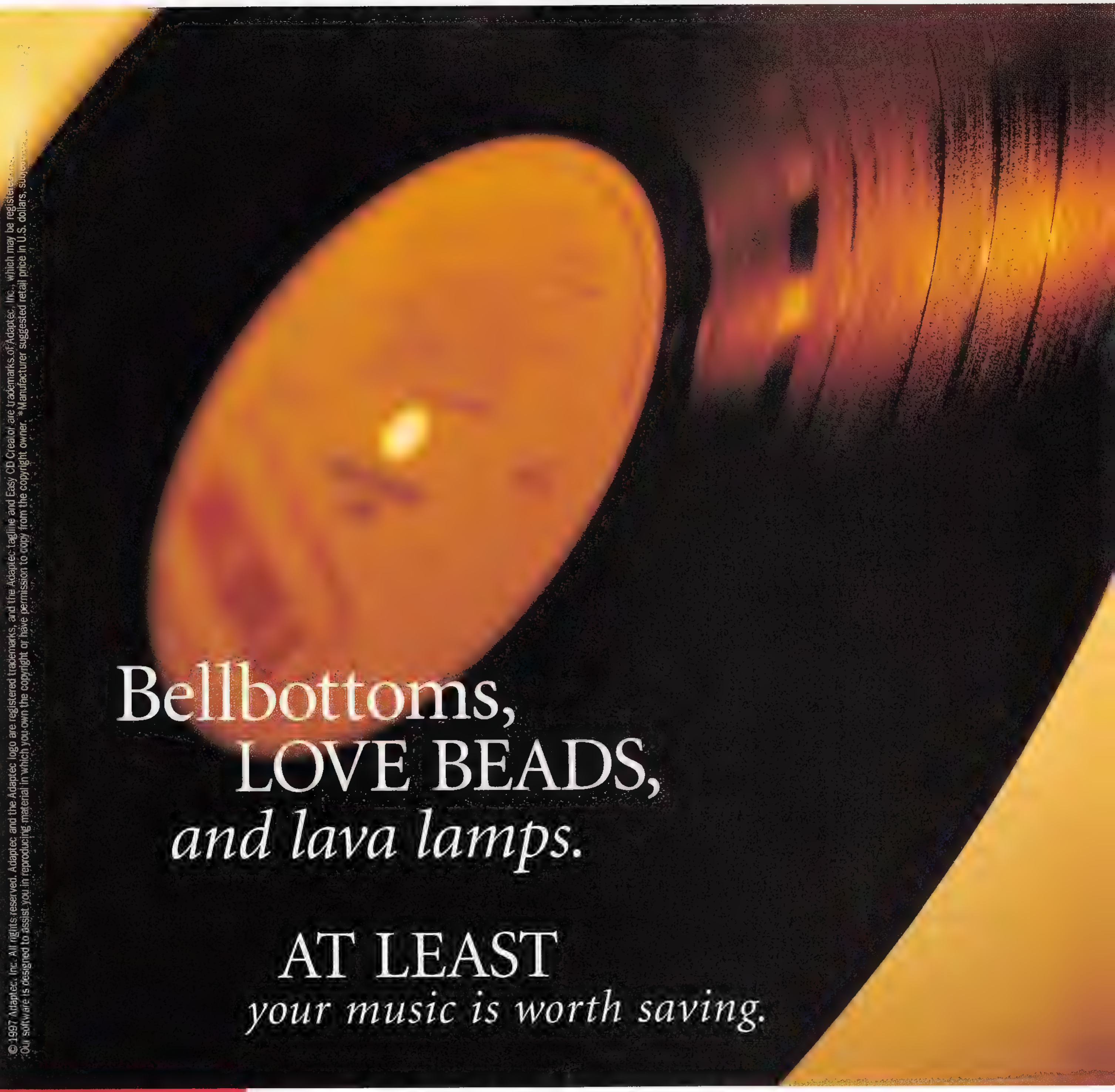

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Product Information Number 87

new photos. You'll find none of us are mullet or mustache-only guys, your original incorrect impression notwithstanding. Can you trust us? Hell, you can fear us! Giddyup!

Going on the Offense

T. Liam McDonald's piece on offensive games was right on! I've been waiting for a long time for someone to come forward and give it straight like this. Too bad you aren't on TV; we could get the message out to even more people. People have gotten too damned sensitive. I've little doubt that these same people who would "protect" us from such "filth" as offensive games, TV shows, and publications are the same ones who were always sneaking a peek at daddy's *Playboy* as a kid, and now have kinky sex all the time. Anyone worried that exposure to this kind of thing leads to more hostile individuals, especially in children, are also nuts. While they were growing up, how many times did they see Daffy Duck get his head blown off by a retarded hunter? Or how often did they witness blatant attempts at murder by Wyle E. Coyote against a docile Roadrunner? Yet they somehow managed to avoid becoming the axe murderers they expect the rest of us to turn into. If you're too stupid to distinguish what happens on a TV or computer screen from real life, then you've got no business being outside of a padded cell.

Scott Holland

> We **Canadians** are **responsible** for a great many **inventions**, e.g., telephone, **wireless** radio, **basketball**, et al.

Apogee Responds

I read T. Liam McDonald's column regarding *Shadow Warrior* and I very much appreciate his thoughts. Most of the press, it seems, thinks we're the devil's spawn.

I also agreed with your article last issue, regarding technology advances taking the place of gameplay advancements.

You can bet *Prey* and *Duke Nukem Forever* will incorporate many genre-expanding, outside-the-box ideas, none of which we've commented on publicly because they're too good and we don't want to give free ideas to all of our *Quake*-engine and *Unreal*-engine licensee competitors. With *Prey*, all we're talking about is technology by design. We don't want to give away too much content before it's release and spoil the surprises. I personally hate to see a movie trailer that summarizes the movie.

Scott Miller
of Apogee Software

Spoofter!

I agree with Mr. McDonald: Games shouldn't be taken seriously. *Redneck Rampage* is hilarious. *Shadow Warrior* the same. I don't think, however, that Lo Wang pokes fun at Chinese or Japanese people; rather at the stereotypes we've come to expect from characters in Godzilla and martial arts flicks. The same can be said for *Redneck Rampage*, it pokes fun at the stereotype not the actual people living in the south.

I just wonder then why Mr. McDonald had to take "two steps back" with his parting comments. " Frankly, we'd all be a lot happier if we just made fun of Canadians. They deserve it." Mr. McDonald seems more than ready to "smack them over the head with a whiskey bottle" were someone to suggest that he were a "drunken moron looking for a brawl" by virtue of his Irish heritage (which I share by the way). Then why would he go out of his way to point at Canadians? This is a specific reference, whereas the video games manage only to poke fun at the stereotypes we've all been accustomed through TV and movies. Jeff Foxworthy, *King of the Hill*, or any low budget martial arts flick. While it was proper to put "offensive game content" in context for us all, what point did it serve to suggest a universal target for ridicule? There are stupid people everywhere. They don't all live in Canada.

Maybe that "drunken moron" would like to bring his whiskey bottle and duke it out in a frozen field near my igloo, eh? Would you believe I had to trade 30 beaver pelts for this month's copy of *boot*!

J. Rose

Kill the Kanucks

I've been a faithful reader of your mag since 02. Man, am I kicking myself for passing up the premier issue when it came out!

That said, I would like to take a moment to ask Mr. Macdonald just exactly why he feels that Canadians, me being one at that, deserve to be made fun of. In his recent article in *boot* 14, he makes this suggestion but yet does not offer any reasons, valid or not, as to why he feels this way.

If Mr. MacDonald can offer said reasons, I would be more that happy to rebuke them and show him that we Canadians are responsible for a great many inventions, e.g., telephone, wireless radio, basketball, et al. I also would be more than willing to face him on the *Quake* playing field and show him how we Canadians are a serious lot.

Donald Cathcart

News Editor Bryan Del Rizzo replies: *Trust me... he was kidding.*

For the record, I'm the token Canadian here. I grew up in Burlington, Ontario, and lived in North Vancouver before I moved down.

You wouldn't believe the amount of ribbing I have to take about saying "out" and "about" and things like "Weetabix" and "Shreddies." And don't get me started on the "Frog" issue.

However, I have the rest of the staff hooked on Smarties (which are not available down here). And if you're so inclined, it would be terrific if a big crate of Swiss Chalet Chicken and Harvey's Hamburgers were to arrive just in time for lunch one day...

Seal of Approval

Regarding Shel Kimen's article on medical info on the net. Free speech is a one of of many rights granted us in North America (I'm from Quebec), but where our health is concerned we need to be properly informed. I understand the need to keep government regulation to a minimum on the net, but people could get sick or die if they get the wrong information. I suggest that the AMA and all the other medical associations of the world set up some sort of screening program where sites having accurate and complete information be given a seal of approval. That way everybody gets their say and the public gets the right info.

James Hogue

Video Killed the bootMark Scores

After a few pages in September's issue, I found out that the Dream Machine isn't the best. Why? Turn to page 99 and compare the chart with the Dream Machine's. You will find out that Win95 Video is almost half the speed of Micro Express'. Can this problem be solved?

Jim Kang

Hardware Editor Andrew Sanchez replies: *The Win95 Video benchmark we use tests Video For Windows speed. While VFW was used early in the day, most users will use ActiveMovie as their codec of choice when it comes to FMV playback. As a result, ActiveMovie takes advantage of your video card's integrated FMV accelerator hardware, as opposed to VFW, which is more of a software driver issue that anything else.*

We plan to use ActiveMovie for our updated benchmarks, but for now, don't worry too much about this score unless Video For Windows performance is really critical in your applications.

A Certain Sacrifice

The fine print on the Dream Machine 97 Contest entry page requires me to worship you before all other gods and demigods.

Does this include all Goddesses and Demigoddesses? If not, I have no problems with the fine print in the rules. Of course, If I should be chosen as the lucky reader who actually wins the Dream Machine, I will be compelled to worship you *boot* editors anyhow, which would probably include having the *boot* logo tattooed on my body, building shrines to you, and of course, organizing large groups of homeless youths to wear bedsheets and distribute flowers in airports in your eternal honor and glory.

Dean A. Ross

Going Up?

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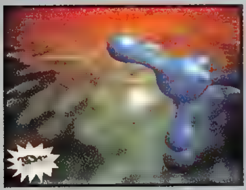
Lust-o-Matic

ON **THIS MONTH'S** DISC:

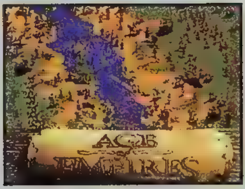
LUST-O-MATIC

Just what is the bootBabe using in the Lust List feature on page 58? Why, it's the Lust-O-Matic, the high-tech Pure Lust dynamo that spits out a holiday shopping list according to how you rate your desires. Don't even think about spending money without first consulting this year's Lust-O-Matic.

SOFTWARE DEMOS:



3Dfx Screensavers: *boot* presents an exclusive suite of 3Dfx screensavers this month. You will of course need a Voodoo-based video card to run them. From the folks at 3Dfx.


AGE OF EMPIRES

Age of Empires: Real-time strategy-fest. Twelve civilizations, a comprehensive technology tree, dozens of units and randomly generated maps, all within a historical context. From Microsoft. Review on page 113

CLOSE COMBAT
A BRIDGE TOO FAR
TRIAL VERSION

Close Combat 2: *A Bridge Too Far* is a historically accurate real-time World War II strategy game that puts you in command of the Axis or Allied powers. From Microsoft. Feature on page 46

Conquest Earth Screensaver: Fight for Earth while desperately warding off an unexpected attack by a superior alien race. Interactive screensaver from Eidos Interactive. Feature on page 43

DARK COLONY

Dark Colony: Send opponents' units disintegrating and dissolving in this real-time strategy game that pits humans versus aliens. From SSI. Feature on page 43

Dark Earth: Dark Earth is *our* Earth, three centuries into the future. Explore a whole city with more than 260 camera angles and 100 3D characters. From Microprose. Review on page 118

Defiance: Lock onto the target, focus the twin laser beams, and blast 'em to smithereens in this first-person shoot-em-up. From Avalon Hill.

Hexen II: A worthy successor to the original, *Hexen II* uses the *Quake* engine—and we love it! From Activision. Review on page 110

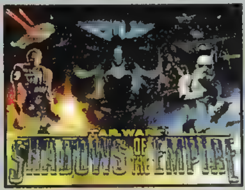
STAR WARS
JEDI KNIGHT
DARK FORCES II

Jedi Knight: Learn the ways of the Jedi in first-person action. And this time you get to use a light saber! From Lucas Arts. Review on page 100

Joint Strike Fighter: The only sim where you can pilot the Pentagon's new multi-role jet fighter. From Eidos. Preview on page 90

NEED FOR SPEED II SE

Need for Speed II SE: The most exotic cars, a full 3D-rendered world, 360-degree POV, and 3Dfx-friendly. From Electronic Arts Review on page 112.


STAR WARS
SHADOWS OF THE EMPIRE

Shadows of the Empire: Find out what happened between *The Empire Strikes Back* and *Return of the Jedi* as you command a variety of vehicles and spacecraft. From Lucas Arts. Review on page 128

Shipwreckers!

Shipwreckers: Cap'n Blowfleet never lost a crewman to th' scurvy, nor a tsunami, nor a creature from th' depths. And but for one pirate—you—Blowfleet held no dread. From Psygnosis.

Terracide: A 3D sci-fi shooter encompassing exploration, frantic combat-and puzzle-solving. Push your video card to the max! From Eidos. Review on page 108

CLASSIC COLLECTION
INTERNET PLAYABLE BOARD GAMES
RESEARCH

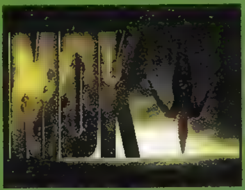
Internet Board Games: Combines 11 classic board games with the modern technology of the Internet. From JC Research.

BOOTWORTHY DEMOS:

Diablo: Venture deep into the labyrinth to discover weapons, armor, and magical treasures. From Blizzard North. bootWorthy on page 74

Dungeon Keeper

Dungeon Keeper: Defeat enemy keepers and destroy the forces of goodness who try to breach your walls. From Bullfrog. bootWorthy on page 72



MDK: Step into the largest playing environments ever created; action is no longer limited to cramped tunnels and dark corridors. From Playmates Interactive. bootWorthy on page 75

Rocket Jockey

Rocket Jockey: Climb aboard one of the finest new rocket cycles available—then maim your enemies. From Segasoft. bootWorthy on page 73

timeshock!
PRO-PINBALL

ProPinball: Timeshock! A perfect replication of arcade pinball; an unparalleled sim. From Empire Interactive. bootWorthy on page 73

NUGGETS

Companies Divided On DVD Audio Spec

With DVD-RAM specs multiplying faster than bunnies in heat, it shouldn't come as much of a surprise to hear that at the recent Audio Engineering Society (AES) Convention, two incompatible and competing specs for DVD Audio emerged. And like DVD-RAM, it appears a showdown between the two distinctive formats is inevitable.

In one corner is a system based on linear pulse-code modulation (LPCM), the same format used for the audio CD. Aside from a higher-fidelity sound reproduction, backers such as Pioneer, JVC, and Toshiba claims that LPCM's use of the recording industry's established infrastructure make it the obvious CD successor.

In the other corner is the Sony and Philips-backed Direct Stream Digital (DSD). Although this bit-stream coding-based format would require an industry shift in multi-channel recording, DSD proponents claim it will achieve superior audio spatial representation. A possible compromise might use LPCM as a minimum requirement while leaving room for new technologies such as DSD.

The DVD Audio Working Group—in conjunction with various recording industry groups—is expected to submit its recommendations this December.

Eidos' Deadly "Directory-Zapping" Bug

Eidos Interactive includes a spiffy surprise for anyone installing its new game Conquest Earth. If you install the game in any subdirectories other than the DOS root directory, all of the data in the subdirectory will be deleted, along with the directory itself. Oops.

Eidos acknowledges the bug exists, and a patch is expected shortly. But it should be noted that the problem only occurs when installing the game under DOS, and not Win95.

CONQUEST EARTH

Sun's Packing A 600MHz CPU

According to Sun Microsystems, its new 64-bit UltraSparc-III CPU will run at speeds of 600MHz by mid next year. But while 600MHz has already been achieved by Digital's Alpha CPU, the UltraSparc-III processor is designed for scalability, so users can add more processors and see an increase in system power.

Packing up to 8MB of secondary L2 cache, the UltraSparc-III will run faster than Intel's forthcoming Slot 2/Deschutes processor, which will more than likely max out at 400MHz, (although Intel reps haven't confirmed CPU speeds for their Q3 1998 processor).

However, a collaborative effort between Intel and Hewlett Packard has resulted in the development of Merced—a RISC-based processor. But if you're holding off buying that new Pentium II-300MHz, don't bother. Merced isn't expected to become available until the year 2000.

> 16

New **Technologies** **Break** Size Barriers

SMALLER, MORE **POWERFUL** OFFERINGS COMING DOWN THE **PIPELINE**

"We can expect to see the performance of our processors double every 18 to 24 months for at least several years." — Moore's Law

Nary a day goes by without an announcement of a new technology that will ultimately make computers either (a) more powerful, (b) more efficient, (c) less costly, or (d) a lot smaller. But while most of these "breakthroughs" will never actually break free from the confines of the laboratory, there have been some major announcements recently in the never-ending quest for a smaller, more powerful machine:

IBM Announces Massive Breakthrough in Chip Design

Following 10 years of research, IBM has produced pilot chips using copper wiring instead of the traditional aluminum, which is reaching its performance limits. Despite the ease of fabricating aluminum-based chips, the metal is not as conductive as copper and at smaller configurations can't deliver sufficient power. The copper-based chips will be able to integrate six layers of metal on a chip, and shrink chip circuitry down to 0.2 microns, the smallest fab in the industry. The new transistors will also feature a 0.12 micron effective channel length, which translates directly into improved performance.

The CMOS 7S, as the technology has been dubbed, should show up in microprocessors in late 1998.

Breakthrough Will Enable 16,000,000MB-Capacity DRAM

The lab coats over at NEC have come up with a new transistor that will allow the company to produce 10-terabit (or 10 trillion bits) DRAM. Current DRAM capacities are just reaching 64-megabit capacities; the new chips can hold nearly 164,000 times more data. In other words, replacing the 64Mb chips on one of today's high-end 128MB DIMMs with their 10Tb counterpart would result in memory modules with 16 million megabyte capacities.

The two-gate construction of the STT (or Surface Tunnel Transistor) sports the first 14-nanometer gate, surpassing the previous 40nm plateau. The breakthrough was made possible when researchers stopped fighting the quantum effect, and discovered an entirely new way of building a transistor.

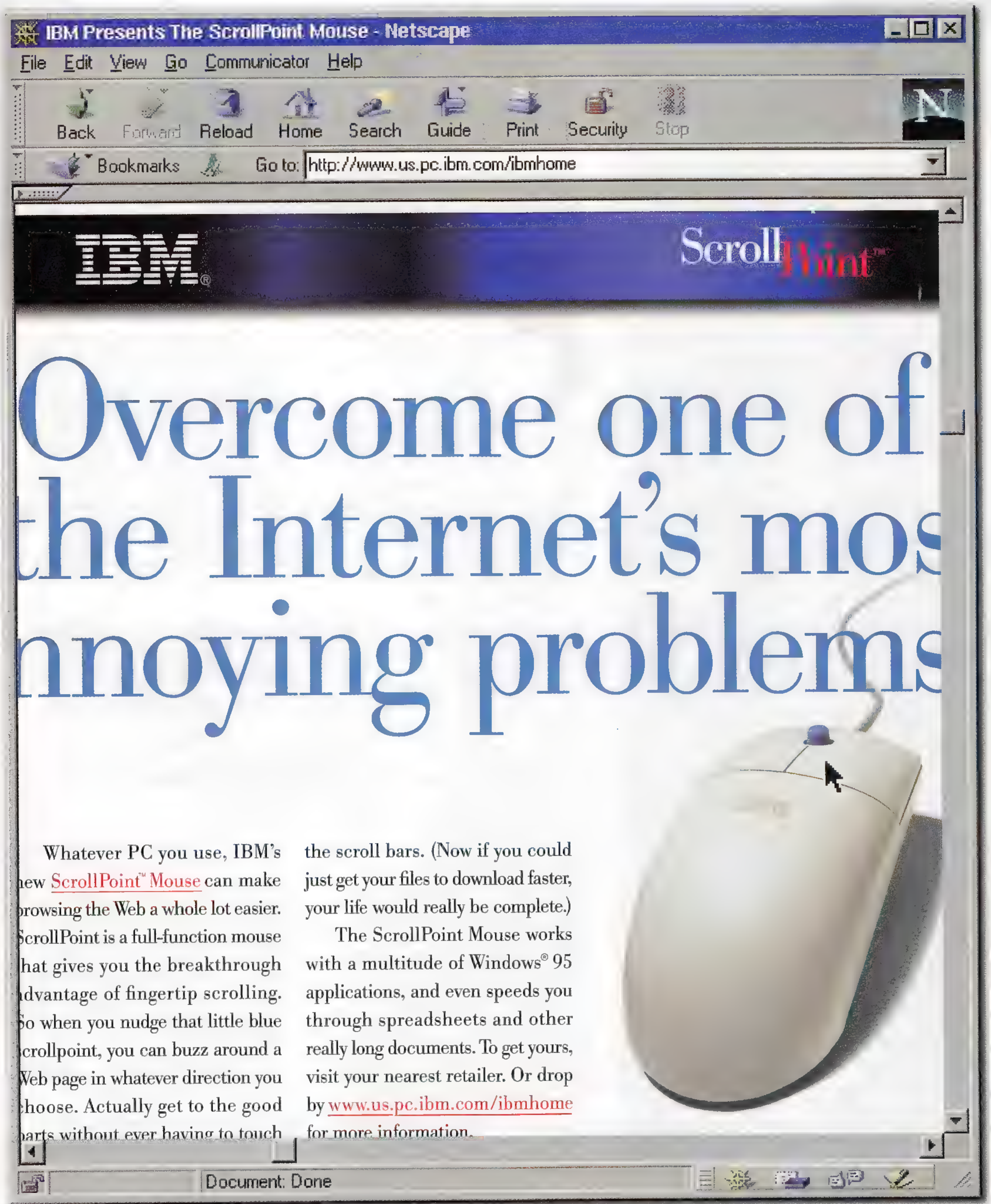
Unfortunately, the breakthrough technology doesn't work with standard lithographic processes, instead requiring an esoteric electron beam, and is at least a decade away from plugging into your PC.

New Laser Breakthrough Will Unleash Smaller CPUs

What do you get if you mix three major chip companies—Intel, Motorola and AMD—a little monetary infusion, and three former Department of Energy labs that used to build nuclear bombs? Answer: a consortium dedicated to building a new laser technology that can reduce the overall size of the CPU to only 0.10-micron fabrication.

The new company—dubbed the EUV LLC—will invest $250 million over the next three years to help fund development of a laser process called "extreme ultraviolet lithography." The EUL technique employs ultraviolet light to etch patterns (smaller than one-thousandth the width of a single human hair) onto silicon chips, ultimately reducing processor sizes down to the highly desirable .10-micron fabrication. Since a smaller-sized processor requires less overhead to run, it's hopeful these new mini-processors will result in less power consumption and heat problems for future computer systems.

So, when will we see .10-micron CPUs? Probably within the next 18 months, if you abide by Moore's Law. b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Product Information Number 185

NUGGETS

> 14

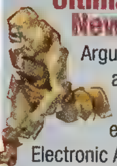
Intel May Purchase Alpha from Digital

According to a report in the Wall Street Journal, Intel is negotiating the purchase of Digital's high-speed Alpha chip for more than $1.5 billion, although both sides are refusing to comment on the deal.

Despite blazing speeds, Digital has not been able to effectively leverage the Alpha against Intel's Pentium brand. It's unknown what Intel's plans for the chip would be. The company could continue to market it, assimilate any applicable technologies, or simply scrap the chip. In any case, Intel would be eliminating key competition and freeing themselves from any possible future litigations between the Alpha patents and Intel's next-gen Merced CPU, much like Intel's rumored purchase of the Exponential high-speed CPU patents.

This latest development would come following Digital's lawsuit against Intel for infringing on 10 Alpha patents and Intel's countersuit alleging Digital misused Intel technical data.

Can Origin's Servers Handle Ultima Online's New World?



Arguably the most anticipated online RPG experience, Electronic Arts' Ultima Online may have problems handling the throngs of adventurers gathering in the new virtual community. boot has learned the Ultima Online retail rollout may be limited to approximately 40,000 units, and that EA will be allocating specific amounts to retailers.

Server capacity is the problem. Although Origin promises thousands can log on and roam the virtual world at the same time, currently the servers can only handle about 3500 players each. Plus, Origin seems worried that gamers may not continue the journey after the free 30-day period, and the company is taking a "wait-and-see" approach on whether to add additional servers.

To make matters worse, if the initial Ultima Online users are plagued with slow connections and intermittent log ons, gamers will have more to combat that just the forces of evil plaguing Britannia.

Motorola to Ditch Modems

Motorola has announced plans to unload its low-end modem division in favor of "more strategic technologies." The announcement comes one day after posting strong third-quarter profits tied to sales of semiconductors, mobile products, and cellular subscriber offerings.

The company is currently shipping K56flex modems, and has promised unconditional free upgrades to the final 56Kbps modem spec. In the meantime, the company is having a fire sale on its current ModemSURFR and VoiceSURFR 56Kbps modems. Prices have been slashed by almost 40%, dropping the estimated street price of the products below $100.

It's expected that other modem manufacturers drop their prices accordingly.

17 >

AMD **Unveils** Two New **CPUs**

COMPANY ESTABLISHING A **NEW WORLD ORDER** OF INTEL **ALTERNATIVES**

Fighting against major production problems, and Intel's migration to Slot 1, AMD's forthcoming Socket 7 processors are getting a new name—and a new lease on life.

AMD's new K6 3D MMX and the K6+ 3D processors are an attempt to cash in on Intel's abandonment of the Socket 7 landscape. Clock speeds will begin at 300MHz (eventually reaching 350MHz and 400MHz), with the new "3D" aspect adding advanced 3D processing, new CPU data transfers, and high-speed cache sorting.

Due in the first half of 1998 is the K6 3D MMX, integrating 24 new proprietary instruction sets (essentially a hard-coded 3D accelerator) enabling accelerated graphics with full-featured MPEG-2 video and AC-3 sound. According to AMD, the new instructions are already being supported by leading 3D game developers (who AMD originally solicited for input), and are fully compliant with Microsoft's DirectX. Also, by shrinking the die-cast to .25-micron, AMD hopes to accelerate floating point intensive operations that can meet or beat Intel's current FPU benchmarks.

Scheduled for release during the second half of 1998, the K6+ 3D will integrate an on-chip 256K L2 cache—a pairing that has already been successfully adopted by Intel's own Pentium-Pro and Pentium-II processors. The K6+ 3D will also support an optional L3 cache for enhanced performance, maintain Socket 7-compatibility, and deliver clock speeds up to 400MHz.

"Our challenge is to ship 15 million units in 1998," said AMD CEO Jerry Sanders III. "If we achieve that goal, we will be well on the way toward our goals of establishing AMD as a credible alternative supplier of Windows-compatible processors."

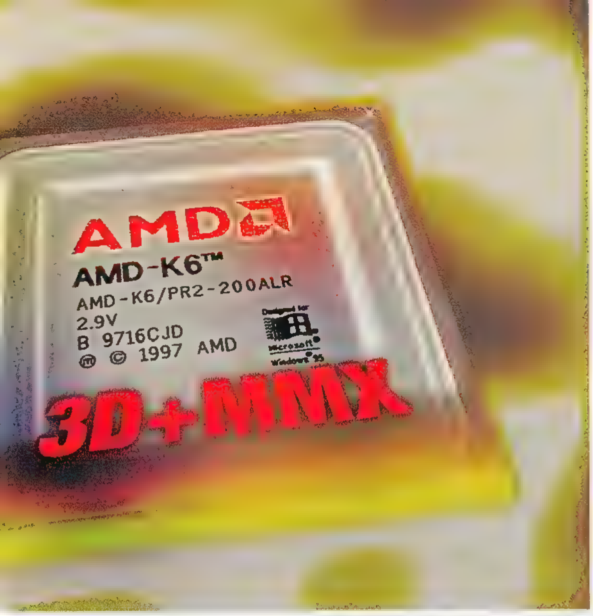
But only if AMD can overcome its production problems.

With Intel mercilessly beating opponents senseless, AMD can't afford any fabrication delays. Unfortunately, the company is getting dinged hard with bottlenecks that include poor production yields, and a less-than-stellar demand for the current K6 processor: despite recent inroads with IBM and Digital, AMD is still finding it difficult to crack the majority of top-tier OEMs who cling tightly to the Intel camp. At press time however, one possible savior emerged: Compaq is rumored to be thinking of using the K6 3D in its line of low-priced machines sometime in 1998.

> "This **processor** will **deliver** a more **powerful** solution for a superior **3D multimedia** experience compared to any **x86 processor** on the market today."
>
> *— AMD CEO Jerry Sanders III*

Even worse, current fabrications aren't producing enough CPUs per yield for AMD to break into the black. The company projected sales of 1.5 million chips in the third quarter, but could only muster a meager 1 million, forcing the company to post a net loss of nearly $32 million on sales of $596 million. So until AMD starts swimming with the smaller .25 micron dies, the current .35-micron processors (including the 233MHz K6) will slowly bleed AMD dry.

Along with the new chip announcements comes word of a new platform development aimed at enhancing the current Socket 7 technology. Dubbed the "Super 7 Initiative", several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B 9716CJD
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Designed for Microsoft® Windows® 95
3D+MMX

> "The **consumer** market is especially **attractive** to AMD. Given the competitive choices, consumers tend to make their purchasing decisions based on **value**, and this is a **criterion** that creates **opportunity**."

vendors—including AMD—will have a 100MHz frontside bus and AGP support during the first half of 1998, accelerating Socket 7 L2 caches by 50 percent. The Super 7 Initiative will enable the Socket 7 infrastructure to scale with higher clock speeds while maintaining cost benefits over Slot 1.

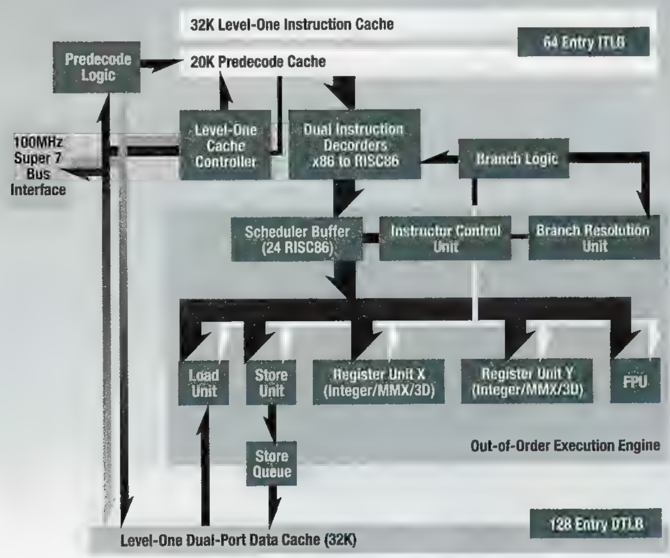
AMD won't begin shipping its Slot-1 processor—the AMD-K7 processor—until 1999, ironically the same time Intel is expected to be putting the finishing touches on Merced, its RISC/CISC-based processor. The K7 will be assembled in a module that is mechanically interchangeable with Intel's single-edge contact cartridge and will feature the bus protocols of the Alpha EV-6 processor. Most importantly, the K7 processor will clock in at more than 500MHz.

A mobile version of the K6 is expected by year's end.

As usual, AMD is setting the price of its newest chips at least 25-percent below Intel's comparable products. At press time, the price of an Intel Pentium II 300MHz was $851, however, a price-cut upwards of 18% was expected in early November. Based on these projections, expect to see the price of the K6 3D MMX somewhere between $500 and $600. b

The AMD-K6 3D In All Its Glory

AMD's integration of 3D into its CPU is certainly a bold maneuver. By optimizing its floating-point processing and coupling this with improved MMX performance, AMD hopes to continue the good fight against Intel's Slot 1 regime. Also note the 100MHz Super Bus interface, which calls for a fast L2 cache speeds, AGP, and more.


32K Level-One Instruction Cache
64 Entry ITLB
Predecode Logic
20K Predecode Cache
100MHz Super 7 Bus Interface
Level-One Cache Controller
Dual Instruction Decorders x86 to RISC86
Branch Logic
Scheduler Buffer (24 RISC86)
Instructor Control Unit
Branch Resolution Unit
Load Unit
Store Unit
Register Unit X (Integer/MMX/3D)
Register Unit Y (Integer/MMX/3D)
FPU
Store Queue
Out-of-Order Execution Engine
128 Entry DTLB
Level-One Dual-Port Data Cache (32K)

NUGGETS

> 16

Intel Announces AGP Titles

Intel has announced the first wave of software titles that'll take advantage of its Accelerated Graphics Port.

Among the games shown was an AGP-enabled version of Rage Software's Incoming, sporting higher resolution terrain textures than its PCI counterpart. Psygnosis' G-Police, a first-person futuristic flight sim, showcased FMV textures streaming from system RAM, as well as enhanced high-resolution explosions. UbiSoft's arcade motorcycle game Redline Racer also packed high-resolution textures and frame rates well past 30fps.

But like all new technologies, it will take time to develop a robust software library. Intel is working with a variety of other developers in an effort to drum up support for AGP, and expects a plethora of titles by early 1998.

In the meantime however, here's a list of AGP-enabled games and educational software that will be ready for the upcoming holiday season:

***TITLE*, PUBLISHER**
G-Police, Psygnosis
Redline Racer, Ubi Soft
O-Zone, Electronic Arts
F-22 Air Dominance Fighter, Ocean/Infogrames
Tex Murphy: Overseer, Access Software
Incoming, Rage Software
Beyond The Third Dimension, Davidson and Associates
Eyewitness Virtual World Atlas, DK Multimedia
Flying Nightmares 2, Eidos

Jazz And 3Dfx Defend Voodoo Rush

3Dfx and Jazz Multimedia are busy putting out the fires raging in the Usenet over substandard performance with id software's GLQuake utilizing a Voodoo Rush 3D accelerator.

In a side-by-side demonstration, both companies performed a timedemo benchmark using identical Pentium 200MHz MMX machines armed with 128MB of system RAM. One machine was armed with a Matrox card and Diamond's Monster 3D, while the other had Jazz's Adrenaline Rush installed.

The results? The Diamond Monster 3D/Matrox combo pumped out 29.7fps using DEMO1, while the Adrenaline Rush posted 27.7fps.

Does 2fps make a difference? Hardly… unless you're talking a difference between 15 to 24fps, or 30 to 60fps.

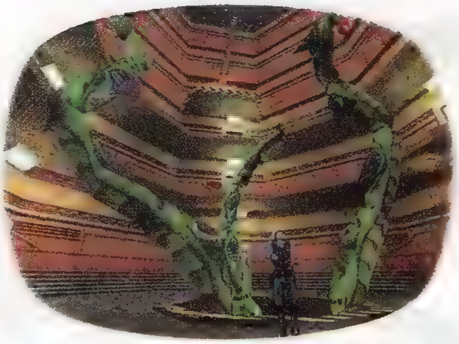
The problem is, the majority of performance problems stem from the original Hercules Stingray 128 3D card (a first-generation Voodoo Rush daughterboard solution). On Alienware's Blade P200MMX system (reviewed in boot 13), the Stingray 128 3D pumped out a paltry 20-odd fps. Unfortunately, optimized drivers are still forthcoming from Hercules (hopefully released by the time this issue hits the newsstand), and the lack of a flash BIOS relegates on-the-fly hardware incompatibility fixes to software TSRs.

If you own one of the original Voodoo daughterboard and you're jonesing to trade it in, expect to get a Diamond-based 3Dfx board with pass-thru cable and software drivers only.

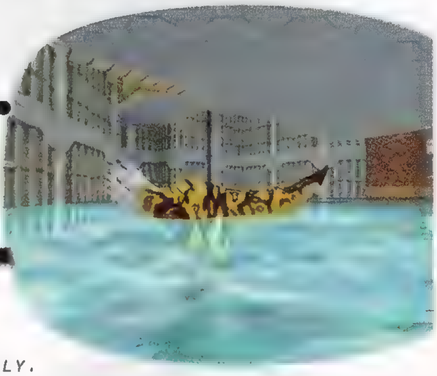
How the Voodoo Rush performance hit will affect other Quake-based games, including Quake II remains to be seen. b

$t_{1/2} = \frac{\ln 2}{\lambda}$ = decay constant
MATURE
M
VALVE
SIERRA®

STERNUM.



SHE'S SMART, HAS A GREAT PERSONALITY, AND KNOWS THAT THE WAY TO A MAN'S HEART IS THROUGH HIS STERNUM.



She's a trained government assassin whose only goal is to silence you— permanently. And you're running out of places to hide.

Think the only opponents worth fighting are those you meet in a deathmatch? Think again. With Half-Life's advanced character AI, you'll battle enemies so smart, you'll swear they're alive. They'll take cover, recruit others and work together to bring you down.

And the realism doesn't stop there. Things act, look and sound like they do in the real world. We could fill your head with terms like 16-bit color, full-spectrum lighting, DSP Sound, and skeletal animation. What it all means to you is a game so real, so unpredictable, so alive, you'll swear it has a pulse. Add a 3D card and your own pulse will race. Create custom levels with Worldcraft 2.0 (included). Of course there are multiplayer options— for up to 32 players. But how many of your friends are as beautiful as she is, or as deadly?

Play the demo @ www.sierra.com/half-life

HALF-LIFE

HALF-LIFE
SIERRA

Product Information Number 310

PURE LUST

HIGH-TECH **TOYS** AND **TOOLS** WITH THE **RIGHT STUFF**

COMPILED BY DAVID PESCOVITZ

SSP-VG1 Video Glasses Shadow Security's SSP-VG1 Video Glasses look like standard Buddy Holly specs, but their beauty is in the secret built-in video camera and amplified microphone. The super low lux CCD camera—color or black-and-white—is activated by an optional sleeve switch that also controls any EVO 200 video recorder. These $2,295 eye-spies, seen in the movie Mission Impossible, operate on included Ni-Cad batteries, and are available in tints ranging from standard sunglasses, to photogray, to clear. Shadow Security, 707.829.7965

Elevation Wave Microwave Oven The problem with most microwave ovens is uneven cooking: Your baked potato's skin is smoking, but it's chilly on the inside. Samsung's MG6876W Elevation Wave Microwave Oven features an elevating turntable that raises and lowers your chow as it cooks to ensure uniform cooking. The 1.1 cubic foot capacity Elevation Wave is equipped with a sensor that automatically calculates cooking time by food type, and also offers a 1300W grilling function to actually brown meat instead of just heating it. Nuke 'em neatly for $300. Samsung Electronic America, 800.767.4675, www.samsung.com

Topeak Alien The Topeak Alien is a 20-function folding tool that'll keep you alive in the hilly outback—or any modern bike shop. Divided into two halves that open with the press of a button, the Alien is outfitted with Allen wrenches, box wrenches, Phillips and flathead screwdrivers, a stainless steel knife, a bottle opener, a universal chain tool, spoke wrenches, and two tire levers. All this in just a 3.4x1.8x1.5-inch casing weighing in at 220 grams. The Alien carries a 25-year guarantee, and at $44.95, it's an affordable way to keep you on the trails. Topeak, 800.213.4561, www.topeak.com

Pioneer CDJ-700S DJing has entered the digital age thanks to Pioneer's CDJ-700S professional CD player. The CDJ-700S is designed to emulate a turntable: A large dial replaces the fast-forward and rewind buttons, and a tempo slider makes it possible to match beats between two CDs. The Master Tempo control locks in the pitch even when the tempo changes—no more Chipmunk sounds when tweaking the beat. You can't scratch on the CDJ-700S, but you can sample and loop sequences with the push of a button. Add the Pioneer DJM-300 mixer, and start CDs by simply sliding the fader. A full system—two CDJ-700S units and the DJM-300 mixer packed into a hard-shell case—runs $3,400. Pioneer New Media Technologies, 310.952.2111, www.pioneerusa.com

Tune In! Don't wait until you lose that piece o' crap remote control that came with your TV, or VCR, or cable box, or DVD player, or stereo amp, or… well, you get the picture. Tune In! is a universal replacement remote with some serious cajones.

Above and beyond the usual slew of channel surfing features (channel, volume, mute, play/ff/rw, etc) the Tune In! takes total control of up to 6 devices with power tools such as bookmarking a channel for quickdraw viewing, tabbing your top ten channels for search-and-destroy missions, and the two-channel toggle for hot back-and-forth action.

If you're jonesing for Spice Girls and can't recall the channel number for MTV, never fear! Just punch in the music television call letters: M-T-V and you've got what you want, what you really, really want.

If you want to step up to some more hardcore programming, the Tune In! remote accepts multi-step sequences for TVs, VCRs, cable boxes, DSS/DBS receivers, amplifiers, amp tuners, audio cassettes, CD players, digital audio tape, laser disk players and other audio and video components. $50 Beery Systems, 937.866.9006, www.theclicker.com

Canon
optura
Canon
35x

Canon Optura Canon's first worldwide entry into the digital video camera market combines the company's 35mm SLR design with digital imaging camcorder technology. The Optura uses a Progressive Scan CCD image sensor to deliver full-motion video and stillframe digital photographs with a single scan of its 360,000 pixels, capturing a full frame every 1/60 of a second. The Optura's optical zoom lens features 14x magnification, but is extended to a full 35x magnification using the digital zooming feature. The Optical Image Stabilization System cuts down the shakes when looking for that long-shot. The Optura weighs approximately 2 lbs, and will lighten your wallet to the tune of $2,699. Canon U.S.A., Inc., 800.652.2666, www.canondv.com

StarTAC
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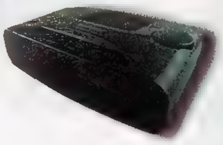
Wearable Digital
GSM 1.9
MOTOROLA
MENU
OK
1
2 ABC
3 DEF
4 GHI
5 JKL
6 MNO
7 PQRS
8 TUV
9 WXYZ
0 OPR
PWR
RCL
STO

StarTAC Select 8500 Motorola's StarTAC Select 8500 VIP digital telephone resembles a Star Trek communicator. The name is awfully similar, too... Hmmm... Regardless, the StarTac Select is the world's smallest and lightest digital PCS phone. Selling for around $800, the phone is designed for use with PCS 1900 networks, promising better encryption and voice quality, and bonus features such as alpha-numeric paging. An icon-driven interface makes programming the StarTAC easy, and VibraCall Alert keeps your popularity from annoying others. Of course, analog mode is an option for when you're roaming outside of PCS land. Motorola, 800.331.6456, www.mot.com



I Spy With My Little Eye For all you aspiring spies or peeping toms out there, the $595 VL-300 Color Video Lamp is an affordable, high-tech covert surveillance device that easily blends into any décor. But this ain't no ordinary lamp—the base hides a miniature color camera with a super-low 2 lux sensitivity rating with built-in backlight compensation and a 380(H) TVL resolution. A tiny 1.5mm pinhole on the base is large enough to record the goings-on in an entire room.

Not to be outdone, the $795 clock radio and $895 cassette-recorder surveillance products both include 2.4GHz transmitters and hidden color cameras. A receiver capable of penetrating thru walls, floors, and ceiling, (with a range up to 300 feet) is included, and can easily be connected to any video source, such as a VCR. American Innovations Inc., 914.735.6127, www.spysite.com/covert.htm

Rock N Ride Forget force-feedback joysticks—the Rock N Ride is a full-motion, gaming simulator that'll leave you hurling. And that's a good thing!

At the heart of this totally wicked chair is an embedded microcontroller translating traditional PC joystick controls and directions into synchronized chair movements. An air-compressor feeds both axis, rotating the chair and frame up to 60 degrees in all directions. The result? An exciting, full-range of motion, heart-pounding experience. For more dramatic thrill, there's even a sub-woofer mounted directly under the seat. Even better, since the Rock N Ride plugs into a standard PC gameport, no special hardware or adapters are required. A gameport pass-thru is also included.

For a balls-out gaming experience, the Rock N Ride is da' bomb. Just make sure you bring along the Dramamine. Rock N Ride, 888.431.9893, www.rocknride.com

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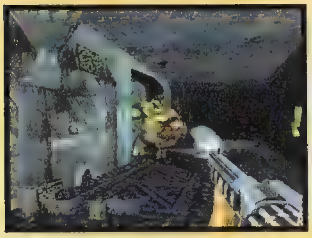
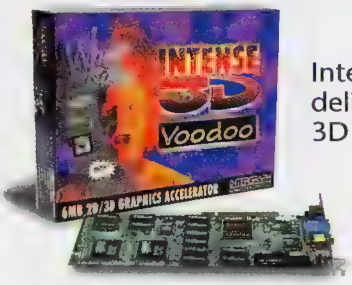
Moto Racer



Turok: Dinosaur Hunter

Longbow FX



Intense 3D Voodoo delivers arcade-quality 3D graphics on *your* PC.

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Product Information Number 306

THE SAINT

WITH ALEX ST. JOHN

The **Best Twitch** Games **Online**

WHAT THE **GAMING INDUSTRY** CAN **LEARN** FROM **PORNOGRAPHY**

Today I'm redefining the term "online gaming" to mean: "Any entertainment content published on the Internet that is so bad nobody is willing to pay for it." If a game fails to sell on a store shelf, we call it a "bad game." But on the Internet, we call it a "potential market."

If no form of online entertainment content made any money, I'd wonder about its viability, but in fact the Internet is swamped with profitable entertainment content.

While I was working for the collective, I once saw a statistic that said 60% of the Internet's bandwidth was consumed by porn downloads. On Microsoft's own website, the second most searched for word (after "DirectX") is "sex." I told our web people that if we put the slogan "DirectX is better than Sex" on the DirectX web page, it'd get nearly all the traffic on the Microsoft site.

They didn't take my advice.

ALEX ST. JOHN From his position as Microsoft's game technology evangelist, Alex St. John was responsible for the controversial DirectX APIs that have either taken PC gaming to the next level or were horribly broken, depending on your point of view.

Like many new mediums, porn is the driving content of the Internet. And guess what? It makes a ton of money (big surprise). Funnier still, the money isn't being made by brilliant Silicon Valley startups and money-bloated corporations. It's being made by half-blind, hairy-palmed, degenerate college-age kids. The 23-year-old geniuses are renting warehouses, paying strippers to dance in the shower, and broadcasting the whole thing over CU-SeeMe. What a life! So what can online game developers and publishers learn from the success of porn content on the Internet?

Online pornography distribution has such minimal technology requirements, it's nearly a pure content business. This proves that if you remove technology barriers, the right game could be as "popular" and profitable as porn. We just aren't making the right content.

And porn proves online content that people will happily pay $5 a minute to consume exists. Face it, maybe the games we're publishing online suck (or don't suck, as the case may be).

Part of pornography's success can be attributed to de facto standards that make it simple for the consumer. Everybody is so busy posting dirty pictures and making money, nobody's fighting over whose porn API or SDK to use. Porn publishers don't have teams of evangelists and marketing people trying to talk porn content creators into authoring exclusively to the Glideporn or DirectSex format. Sure, *Playboy* generates its own proprietary content, but it isn't fighting with the Microsoft PornZone about owning technology standards. While online game companies fight to bind content to proprietary technology, pornographers compete purely on the quality of the entertainment experience they provide.

Everybody is so busy **posting dirty** pictures and making **money**, nobody's **fighting** over whose **porn** API or SDK to **use**.

The computer industry has fixated on the notion of creating the next Microsoft, and the strategy generally centers around establishing a technological monopoly. But out in the real world there are lots of examples of successful business models that don't require this. Most hotels, for example, will refer you to their nearest competitor if they're full or don't offer what you need. Major bookstores will find a book you want at their neighboring competitors if they don't have the book you want in stock. Airlines will book you with competitors if they have a problem getting you to a destination. These are industries that have learned to succeed through forming a community, rather than by alienating one another.

Remember that kid who got rich posting live video of women showering? He pays a 33% commission on his profits to any website that posts his URL and refers him a paying customer. Do you see TEN, Mpath, GameZone, and Engage cross-promoting each other this way? No, they're so busy drowning one another in their struggle to survive, they can't get together on building a raft.

I keep hearing these folks say they'll make up their money on advertising. In other words, they'll make money by talking suckers into paying for ads directed to customers whom they can't manage to sell to themselves. For advertising models to work, you have to build a pool of customers who are established buyers of your content. Profitable porn websites make a substantial amount of money advertising and selling secondary services to customers who have established themselves as people willing to pay for primary services. How effective is it to advertise to a community of 400,000 card-game players unless you're Hoyle?

Reading this, many may wonder what my personal favorite online multiplayer game is. Well, it's the only online gaming experience bigger than porn, in terms of dollars. It's played by millions of players every day, and it awards instantaneous cash prizes. The content is upgraded constantly, and all the technical barriers to its adoption have standards. And it has no flashy 3D interface. It's E-Schwab, and the money rolling in makes the online porn business look about as lucrative as online gaming must look to Hugh Hefner. Oh, and you can find free stock quotes on *Playboy*'s website—*they* get online gaming.

If you don't do
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Product Information Number 243

GAME THEORY

WITH T. LIAM McDONALD

Making **Game** Journalism **Safe**

CONSIDER THE **ETHICS** OF THE **ACCUSER** BEFORE **COMING** TO **CONCLUSIONS**

T. LIAM MCDONALD is the all-knowing god of gaming. His mother still can't believe that he plays games for a living.

Last week I tuned into a new gaming web site sponsored by the *San Francisco Bay Guardian* to be informed that all of us who do this work—writing about games—are a bunch of corrupt naves. The writer, one David Israels, was bent on cleaning house. In fact, after his series of articles ran, he claimed to have changed the game magazine business, and that magazines were making policy "due solely to my reporting."

For those of you from the parts of the world that aren't about to fall into the Pacific Ocean, the *Bay Guardian* is a weekly throwaway that fancies itself "alternative." Israels' articles were shameless (and, in that respect, largely successful) attempts to attract traffic to his site while making himself out to be the hero who was going to turn this dirty business around. This came as a surprise to many in the business who were prompted to ask, "David *who*?"

He napalmed the industry with a series of withering though not wholly coherent articles, tarring every magazine in the business. His personal *bête noire* was the "press junket," those pointless trips writers take so companies can bombard them with information on their new games, many of which will: (a) never ship, (b) be buggy as hell, and (c) probably suck. Travel on a game company's dime horrifies Israels beyond belief, despite the fact that it rarely happens (magazines can afford their own airline tickets and hotels). Oh, he also thinks the magazines are just extensions of the publishers' PR departments, and that we dutifully print anything we are told to. For all I know, he thinks his tin foil hat will protect him from alien death rays. The *logic* of his arguments is that convincing.

After **15 hours** of travel, I get to look over the **shoulder** of an **unwashed** programmer for **an hour** while he tries to show the gameplay of his new **game**—only the game **doesn't** have any.

This isn't surprising, since he took his cue to start this muckraking crusade from an Internet stalker and conspiracy theorist who calls himself "Critical Bill." Bill has posted hundreds of libelous messages attacking every writer in the business with accusations of pay-offs, based on zero proof. He also posts "cracks." The irony of Israels launching an ethics crusade based on the accusations of a known software pirate is apparently lost.

The notion that a press junket can somehow "buy" coverage can only be suggested by someone who has never gone on one. I've gone on about a dozen. I don't go much anymore, since most publishers are content to wheel out to my office on their East Coast trips, and show me their products. I don't relish driving an hour to Newark airport and folding my 6' 6" body into a coach seat. After 15 hours of travel, I get to look over the shoulder of an unwashed programmer for an hour while he tries to show the gameplay of his new game—only the game doesn't have any sound, interface, or graphics.

Sometimes, publishers tie their events into helicopter test flights or a ride in a tank to coincide with a new sim. I consider such experiences relevant to the accuracy of my coverage and interesting to my readers.

The media reports on "fake" news events all the time, from press conferences to movie premieres. How is a game junket different from Siskel and Ebert attending a premiere (complete with canapés and booze) for a movie they're reviewing? Or even a White House photo op? Mainstream media regularly covers these pseudo-events.

You can cover a subject from the inside or the outside. From the outside, you only offer opinion on product. From the inside, you talk with the makers, go to the offices, even (horrors!) befriend people in the business in order to keep fans informed. The duty of the ethical journalist is to know when to rescue himself: to see when the impartial eye is compromised. Struggles with objectivity and fairness are core to the writer's experience.

Israels' accusations of corruption sound hollow in light of his own egregious lapses. While working for Gamecenter, he used a review to castigate competing game-based web sites, a clear conflict of interest. In his initial article, he stated that *PC Gamer* "failed" to return his calls about policy. In fact, editor Gary Whitta spoke to him not once, but twice, to explain *Gamer*'s policy. Israels' journalistic sins are many. He has excluded important facts in order to sustain a preconceived theory, rather than letting the facts shape that theory. He has displayed rude and unprofessional Usenet behavior. His articles are biased rants void of content, and display a poor grasp of journalistic techniques.

He "pledges" to follow the ethical guidelines of the Society of Professional Journalists, but twists them in knots.

A few years ago I went to a press event for Spectrum-Holobyte. After eight mind-numbing hours of charts and demos and interviews and speeches, they fed us a lovely dinner on a boat to make up for the day's rigors. Seated to my right was David Israels.

Since the SPJ guidelines mention nothing about hypocrisy, I guess Israels didn't feel it important enough to mention that he is guilty of the things he calls graft. **b**

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ON THE LINE

WITH SHEL KIMEN

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No Wimpy WYSIWYG

WHY CLEAN CODE IS GOOD AND WYSIWYG CAN BE BAD

I had a dream. There was a template, and I just dropped in my text, dropped in my images, dropped in my captions, and clicked "Send to Server."

Clearly, I was delusional.

Following last month's "No wimpy web sites" mantra, this month's mantra is "No wimpy WYSIWYG." What you see is what you get. Hmmm. I'm not so sure. Even on the off-occasion that what you see really *is* what you get, you'd be hard-pressed to find a piece of sophisticated HTML that could be made entirely with a WYSIWYG editor. In fact, I code almost entirely by hand.

My web projects err toward the monolithic. They are large, spanning thousands upon thousands of pages. These projects depend on complex navigation schemes utilizing frames and tables, client-side image maps, and JavaScript—and no single editor handles all of these gracefully.

Complex layers of information require the clever use of nested tables, strategic border control, browser bug manipulation, underground hacks, etc., etc., etc. Point-blank: No WYSIWYG editor is capable of handling this properly without crashing. And translating what one sees in "preview mode" to what one sees in *Navigator* or *IE* is another story altogether.

In order to parse HTML in a timely manner, many WYSIWYG editors add proprietary tags and extensions that may be blind to your browser, but not to anyone who has to go in and hand-edit the document. Simply put: They're sloppy.

Because bandwidth issues are the tour de force of most Internet hoopla, file size is a consistent issue in web page design. So WYSIWYG editors squash together all the lines of code generated, sans carriage returns, to save a few measly K. This is all good and fine—if you never have to edit the code by hand, and if no one ever sources your page to see how you created it. Just as proprietary tags mess up universal decoding, miles of run-on lines make manually editing code virtually impossible. What is seamless on the front end is often a bitch to edit, and I wouldn't wish the torture of hand-editing a *PageMill* file on my worst enemy.

Sloppy code syndrome is most annoying on large projects with multiple people working on a single document. With teams of writers, artists, code monkeys, etc. all working on the same documents, clean code—with comments and proper spacing—is not only courteous, it is *required.* And proper spacing and comment tags can only be done by hand.

Add to this mess the fact that HTML is a rapidly evolving language. Just try finding a WYSIWYG that does *everything.* If your particular WYSIWYG editor doesn't have that one special tag, you'll have to go in and edit by hand. And if your WYSIWYG editor spits out run-on gibberish (which it most likely does), you may as well call it a night. The time it takes to sort through the cryptic mess of alterna-parsing tags and "inventive new ways" to lay out tables would have been better spent learning HTML in the first place.

The need for *all* the available HTML tags yields another problem—interface design. Just how does one build a user-friendly interface that accommodates all the myriad tags and functions available in modern HTML? My editor, which is only about half spec-compliant, has more buttons and file menu options than I can reasonably handle in a single sitting.

Where do I click? Where's the bold tag? How do I make macros? Is that even possible? A staple program such as *Photoshop*—chock full of file menus, palettes, and buttons—took years to perfect. Now it's even intuitive. Is it possible to design, QA, manufacture, and distribute an HTML editor in under six months with an even passable interface, let alone an intuitive one? Apparently not. And how about standardizing tag icons? Will I devote the hours needed to learn one tool and then be completely unable to use another? Yes, most definitely.

What is **seamless** on the **front end** is often a **bitch** to **edit**, and I wouldn't wish the **torture** of hand-editing a *PageMill* file on my **worst** enemy.

If you must invest in one of these mammoth programs, make sure it at least has customizable palettes. It very well could be that you'll only need the Bold, Italic, Font Size, and Table tags for a set of pages. The extra bazillion buttons not only eat memory, they also waste valuable screen real estate. All of this is not to say there aren't any good editors out there. *Hot Dog Pro* and *Front Page* serve the needs of most people. And *BBEdit* (which I'm still pining for on the PC) is most certainly the mother of all HTML editors—a hybrid WYSIWYG/text editor, which is really the most efficient way to go.

Bottom line: You *must* know your HTML inside and out if you're going to create anything worth a damn on the web, at least in these early days. This includes taking the time to keep current with the spec, making sure your code is clean, and adding comments so others know what the hell you're doing.

I learned HTML from other people's work on the web: I saw something I liked, and adapted other people's code to fit my needs. What would I have done if that code came out of a silly editor? In the Internet spirit of exchange and reuse, making your code as decipherable as possible for newbies is a good thing, which means most WYSIWYG output is a bad thing. b

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FAST FORWARD

WITH TOM HALFHILL

New **C6** on the **Block**

CISC MEETS **RISC** IN **IDT**'S NEW PENTIUM-CLASS **CPU**

TOM HALFHILL is a senior editor at *Byte* magazine and the author of two computing books. He first became interested in computers during the disco era.

Seems that Intel is about to get some fresh competition. Sure, it's more like a gnat buzzing around the head of a giant, but it's still competition—and it's bound to push CPU performance skyward and PC prices downward.

The newcomer is Centaur Technology **(www.centtech.com)**, a subsidiary of Integrated Device Technology (IDT). Centaur's first product is the IDT-C6, a radical Pentium-class processor aimed at desktop and notebook PCs (see *boot* 12's cover story for the first report).

Centaur and IDT aren't household names. IDT is mostly known for making the SRAM found in CPU caches, and as a manufacturer of Rx000-series RISC processors. Centaur is a "stealth start-up"—IDT founded the company in 1995, but kept it secret until a few months ago. No point in provoking Intel's wrath any sooner than necessary.

The appearance of a new x86 contender almost qualifies as a quantum singularity. Intel used to have lots of competition, but over the years the number of companies making leading-edge x86 chips has dwindled to only two: AMD and Cyrix. (IBM sells Pentium-class processors, but they're actually Cyrix designs manufactured by IBM.)

The shrinking competition is odd, considering the x86 is by far the most popular and lucrative CPU architecture in the world. About 80% to 90% of all personal computers have x86-compatible CPUs, and Intel's gross profit margins are soaring over 60%—higher than Apple's profits during the Macintosh's heyday.

Centaur is working on **faster** variants of the C6, and the **simplified** core should make it **easier** to rush new chips to market. Centaur claims it can rev the design every **six** months...

One reason Intel has few rivals is that it's pared back licensing x86 technology. Also, Intel is a formidable competitor, leveraging its vast resources to establish a lead in design and fabrication that's hard to match. And because state-of-the-art microprocessors have grown so complex, only a handful of companies can design, test, and manufacture them.

The C6 is a revolt against that complexity. It isn't a RISC chip—no x86 processor is truly RISC—but it does adopt some RISC principles. That's not surprising, because the C6's chief designer was Glenn Henry, now the president of Centaur. After a stint at Dell, he went to Mips and worked on a hybrid CISC/RISC chip that was supposed to run both x86 and Rx000 software. That project died, but some of its principles survive in the C6. In fact, the name "Centaur" refers to the half-man, half-beast nature of the extinct CISC/RISC project.

At first glance, the C6 doesn't seem like a Pentium-class processor. It's the first x86 chip since 1993 that doesn't do branch prediction. It's a scalar processor, which means there's only one execution pipeline for instructions. Almost all modern x86 chips are superscalar, capable of executing two to four instructions at a time in multiple pipelines. It's also a strict in-order machine. The latest CPUs (such as the Pentium Pro, the Pentium II, the AMD K6, and the Cyrix 6x86MX) can execute instructions out of order for maximum efficiency. Also, the C6 doesn't execute instructions speculatively—a refinement of branch prediction that allows a CPU to guess what a program is going to do next.

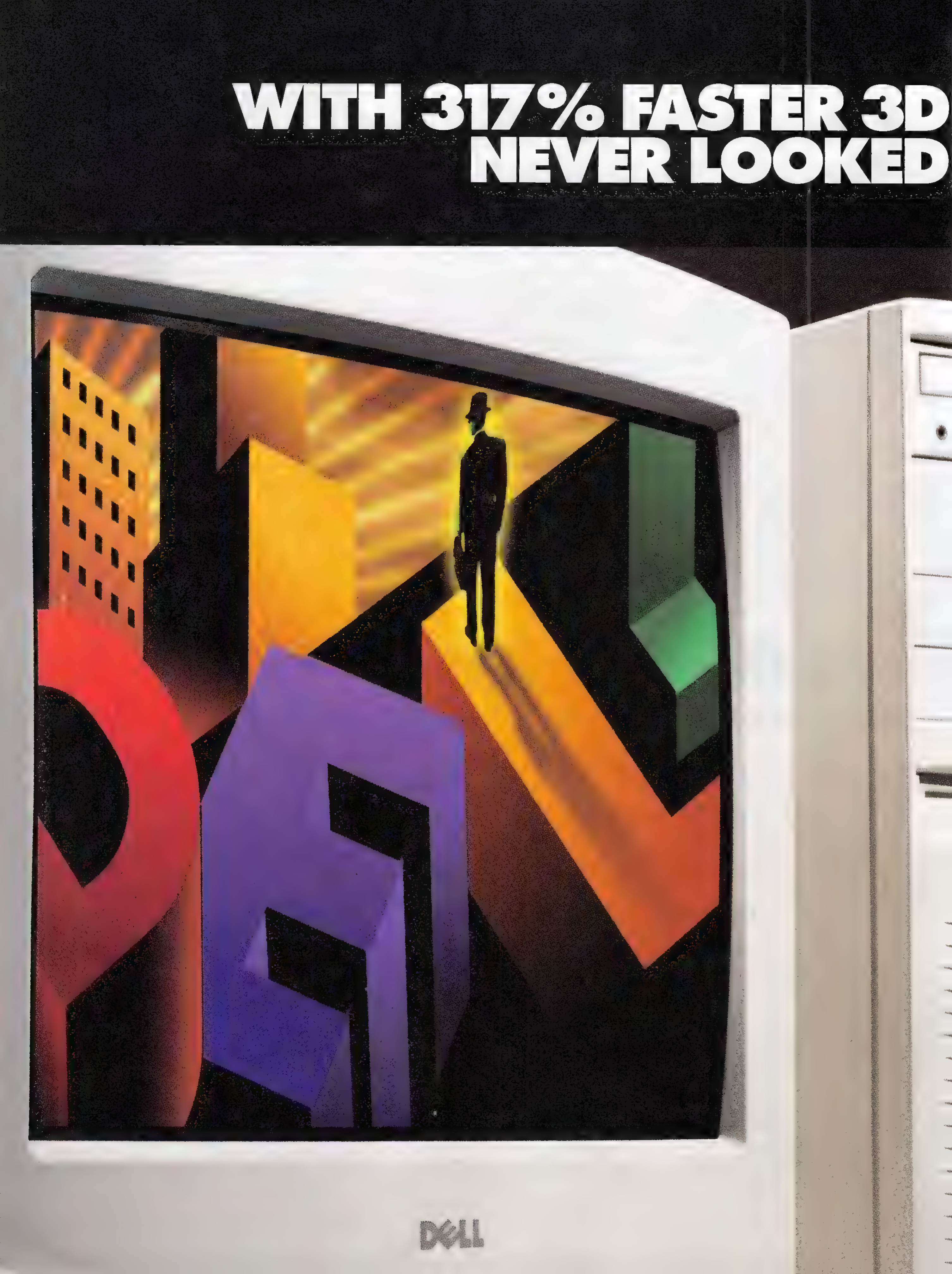
Indeed, the C6 appears to have more in common with the 486 than with a Pentium. But don't be fooled. It has twice the onboard cache of the latest Pentiums and Pentium II. It has an extra translation stage not found in a 486 pipeline; the additional stage translates complex x86 instructions into simpler, RISC-like microinstructions. It has a special queue that can hold up to three instructions while another instruction is executing further down the pipe. It has a special stack that stores return addresses from branches, eliminating a slow memory operation. It has a small additional cache that stores entries from the page-directory table, which averts another slow memory access. And it has MMX.

By stripping down the core to bare essentials and adding these enhancements, Centaur has created a simplified CPU that packs 5.4 million transistors in only 88 square millimeters on a 0.35-micron CMOS process. Initial versions will run at 150, 180, and 200MHz, and perhaps as fast as 225 and 240MHz by the end of this year. Its benchmarks virtually match a P55C-series Pentium clock-for-clock. The C6 should appear late this year in low- to mid-priced desktop and notebook systems.

But you won't find the C6 in high-end desktop systems—at least, not at first. Like AMD and Cyrix, Centaur doesn't think floating-point and MMX performance are important enough to justify the more aggressive pipelining found in Intel's chips. Consequently, the C6 suffers the same handicaps as the K6 and 6x86MX. For most people, the FP and MMX will be good enough. For extreme users, it's not.

Centaur argues that the money you'll save on a C6 system will buy a screaming graphics card that boosts overall performance beyond an Intel-based system of the same price. Only more benchmarking will tell for sure. Meanwhile, Centaur is working on faster variants of the C6, and the simplified core should make it easier to rush new chips to market. Centaur claims it can rev the design every six months, an exceptionally ambitious schedule.

In a sense, though, it doesn't matter. Intel is fueled on paranoia, and the company takes new competition very seriously. Even if you never buy a C6, your next CPU will probably be faster and cheaper because of noisy little gnats like Centaur. **b**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WORLD RECORD SETTING
RACING ENGINES

the boot interview

On the first day, **id Software** created Wolfenstein 3D—the debut first-person shooter to confront the issue of 3D on the PC. And it was good. Soon, the small Texas-based startup had a shareware **megahit** with the legendary game **Doom**, and the game world began paying attention. **Ambitiously**, id set out to break its raycast bonds and create the first **true 3D** game. Thus was born Quake, arguably the **best PC game** to date, and nothing would be the same again.

Along the way, the technological idealists at id faced **opposition**. Mighty Microsoft, via outspoken evangelist **Alex St. John**, began pushing Direct3D as the dominant API. But id had other preferences, and company owner/lead programmer **John Carmack** has rallied developers against D3D and become alternate API OpenGL's...

Ad Hoc Ev

PHOTOGRAPHS BY MARK MADEO

While he's parted ways with Microsoft, ***Alex St. John*** *still defends DirectX. He traveled to the Lone Star state to talk about APIs, software patents, 3D hardware, the best talents in the game industry, the volatility of plan files, politics, ethics, and the future of SGI's OpenGL with* ***John Carmack*** *and id's outspoken new programmer* ***Brian Hook****.*

St. John ***If a Microsoft recruiter came down here and said "We'd like to hire you all to come fix DirectX" would you guys go?***

Hook I'd probably go. John wouldn't.

St. John ***So what would you do with Direct3D if you were in charge?***

Hook Hold it, hold it. There's too much speculation here. Having talked to enough ex-Microsoft employees, I know it's a very political landscape. It doesn't matter how good you are technologically, because there are people up there right now who have the capability to solve this problem, but politically do not. So you don't need me to go up there—what you need is someone up there willing to dictate on strategy, end of story, that's it.

Carmack Well, I don't know if I agree. I undervalue the strength of politics. I am a technical idealist at heart and I think that if you put someone up there that knows what the hell is going on, and they have authority over the code base, they can fix it. The final word is what gets built into the executables.

Hook I think a pretty much infallible case has been made for OpenGL and Microsoft has effectively come back and said "Screw you."

Carmack *[laughs]* Brian's current conspiracy theory is that Microsoft is investing in Apple to force them to adopt D3D or something.

St. John ***That's not the most irrational thing we've heard. So, what do you two think about Microsoft showing*** **GLQuake** ***running on top of Direct3D?***

Carmack It was worthwhile, although it's like you adopt OpenGL and write some emulation layer to run all the crappy games—such as *Monster Truck Madness.*

I've stated from really early on that the APIs are close enough in functionality that there's not a difference. The difference is in how you access that functionality.

St. John ***I understand the performance is pretty similar.***

Carmack It's pretty close because it's a heavily fill-limited game, so you're bound up by what the hardware can do. If the driver is not totally brain dead, it's feeding the hardware, and you wind up waiting for the hardware. So assume that you have a non-brain-dead driver, then you could put a layer of emulation between it. And that works fine on this generation of games, but it's not going to work in the future. If you scaleup the performance ladder—like where SGI is—then every access to memory is a performance drain. If you start saying "I want to render five million triangles," an emulation layer is not acceptable.

Hook And Microsoft didn't tell us they were going to do an emulation. If they had simply asked "We're going to do this, do you mind?" We would have said OK, because we're just into cool technical stuff. There wouldn't have been a problem, but they didn't even do that.

St. John ***It was my job to get your approval, but they fired me before I could do it!***

Hook Look, this is my view of the people who work at Microsoft. You have a choice. If you're good enough, you have a choice of where you work. You have to realize that what you're doing is bad for the industry. And what you're doing is only good for your personal ego and your personal power trip and your stock options. If you're doing stuff that you don't even agree with and you do it for the money—we have a word for that.

St. John ***So what's that word?***

Hook A whore. And I've never done that. I can sleep well at night. Those people can't.

St. John ***Are there particular people that you have in mind?***

Hook No, I'm not even singling out the D3D team. I'm saying in general that you can have a certain level of honor and integrity, but not a lot of people exhibit that.

Carmack One thing the D3D/GLQuake demonstration did was [illegible] the lines of [illegible]. Microsoft is always trying to [illegible] and put on a good face and

angelist

[illegible]

saying "We're doing what the ISVs want" and everything. But that's really just a front. There's a well-defined agenda that D3D shall rule the universe; OpenGL shall crumble and die.

But Microsoft can't quite come out and say that. And I would respect them a hell of a lot more if they actually did, but they're trying to have your cake and eat it too. And it's just not that way.

Hook Their D3D developer-relations guy sends e-mail asking if there's anything he can do. And then something happens and he'll say "Oh, I had *nothing* to do with that."

It's like "Fuck you! You work there." That's not my problem and I don't respect you for coming up with excuses when *you* come down *here* and start saying "Oh, we *really* want to work with you..." and then pull a stunt like that. You come off as two-faced, you come off as a hypocrite. If you want to work with us, pay attention to us. But it's not what they want to do. They say "Try D3D—you'll like it," And I kept saying "I don't *want* to use D3D. I have something else I like." To me, the analogy was like going to a fast food place and saying "I want a hamburger," and them saying, "We've got a really good chicken sandwich."

You know, we're not supposed to do what Microsoft wants. Microsoft is supposed to enable us to deliver content on their operating system, but they're not doing that. They're flat-out ignoring us to a large degree. And I've heard private comment from members of the Direct3D group where they just categorically ignore anything John Carmack says. Not because they don't believe in him, but because he disagrees with them. It's not John Carmack, it's anyone who disagrees with them. They've done this with hardware people. "Yeah, even though they're the fastest, they don't have enough volume. We don't really need to work with them..." And they do that across the board.

***St. John** SGI can't make much money licensing the OpenGL technology, so they really need to make an NT deal with Microsoft. How does that make you feel?*

Carmack This is where I can just be righteously indignant and disgusted about them. I am a technical idealist and the wrong things are happening. I understand the reasons why some of them are happening and I'll probably learn to live with them, but it doesn't keep me from being pissed-off about it.

***St. John** So even if OpenGL dies, will you remain its torchbearer?*

Carmack No. We're not going to crusade off a cliff. I am pragmatic at the end; there is a limit as to how much I will let idealism damage me because I can adapt to whatever is necessary and Direct3D with Draw primitive doesn't suck.

D3D sucks!

There's just nothing charitable you can say about it. Over the years, Microsoft will make D3D suck less, but they're dragging us through the mud along with them as they figure it out.

But in the end, if SGI *did* give up on OpenGL, we would give it up. I suppose the gentlemen's bet would be that they're not going to bow out in the next couple of years.

***St. John** I'll make that gentleman's bet: I predict SGI will become less interested in providing a consumer API on the PC for OpenGL...*

Carmack Certainly, but they're not going to start running D3D on Infinite Reality.

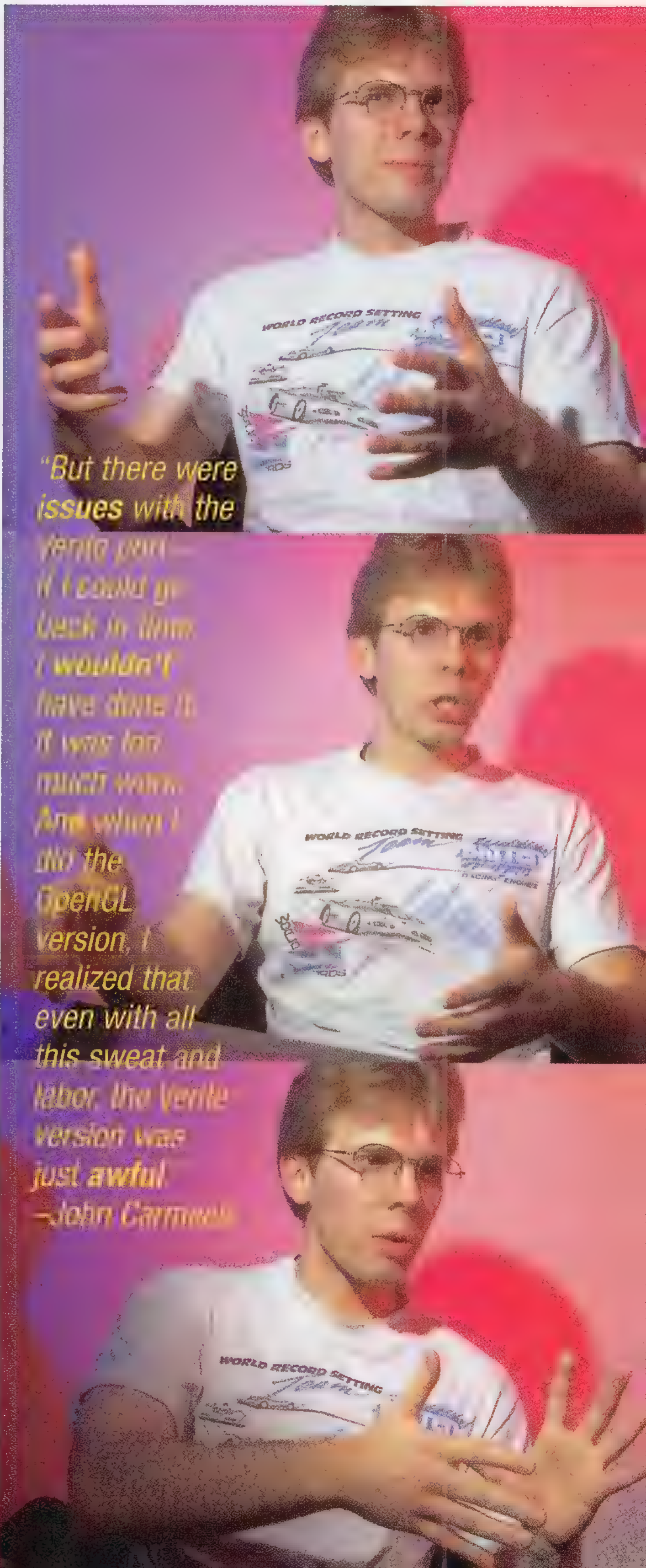
***St. John** At least not for a while. On the other hand, their product mix might increasingly become whatever Microsoft supports under NT.*

Carmack And I think that's wonderful. If we could buy Infinite Reality and plug into an NT workstation, we'd do so. I'd write that $100,000 check right now because I don't like Irix. I don't like their desktop and their operating systems.

***St. John** Do you see hardware companies making a special effort to build drivers just for Quake as a problem?*

Carmack They aren't just for *Quake*. A couple are just for *Quake* now—the 3Dfx and PowerVR ones—although they both intend to evolve to a full version. There are a lot of great things people can do with them.

D3D is not being exercised in application mode. And this is where everybody has always had these vague notions that 3D is going to be important on the desktop. And while I don't think that's really near-term, in general, it's true: You are going to integrate 3D in your desktop experience ... and that's what OpenGL was designed for.



"But there were issues with the Verite port—if I could go back in time I wouldn't have done it. It was too much work. And when I did the OpenGL version, I realized that even with all this sweat and labor, the Verite version was just awful. —John Carmack

It runs full-screen. That was kind of a side-effect, but doing applications on a simple level—such as our map editor and the tools we write here—are things I can whip-out really easily in OpenGL and they work really well. And there are going to be consumer-level things like that which are interesting, and you'll want a robust, full OpenGL driver for.

St. John ***So you think people will be using OpenGL in Excel-type applications?***

Carmack Actually, yes—drawing 3D graphs and everything in spreadsheets is an excellent use for something like that, rather than writing your own 3D transport clip project pipeline to do those little things. But the obvious things of the graphics tools, modelers, map creators, and things like that. It's silly not to write those to an API.

In fact there's a funny thing... Somebody sent me back an e-mail that I had written at least a year ago, where I said, "You should use a commercially available API like Direct 3D." That was before I had done any Direct3D programming. This guy sent it back to me, and it's like "You said this?" It was like, "Yeah, I did say that. I stand by the sentiment that you should use someone else's library." After actually doing a bunch of D3D programming, we recommend using OpenGL, for sure. But at the time, I hadn't used either.

It's important to note that some people have this misconception that we're just being recalcitrant and not wanting to learn something new. But I did Direct3D programming and Brian's done a lot. The thing is: I've only learned OpenGL over the last two years. It's not like I'm some guy at SGI who's been doing it for a decade. I learned it after I left NextStep and then I learned D3D later because I had the best of intentions. I went into it with eyes wide open, and it just *sucked*.

St. John ***But clearly SGI isn't making a big effort to get drivers done and making sure that all the hardware manufacturers are unified...***

Hook They're working with every major IHV that I've been talking to. They're in constant negotiations. Their team is almost the size—in terms of programmers—of the Direct3D team up at Microsoft. They're taking this very seriously.

Carmack Sure, it could be better. It'd be great if they had an evangelist like you were for Microsoft. But we're still like this bug splat to Microsoft, and we can't get them to do what we think is right. This is the first time I'm really trying to use what influence I do have to do something I think is proper and forward-looking for the game industry. And I know I'm not really hurting anyone by doing this. I think that the long-term benefits of trying to push something that's right are good. At the very least, even if we fail, we have put pressure on D3D to examine some of the issues that they wouldn't have otherwise.

And I *do* get mail from people. Most of them really don't understand the issues technically. They think when *GLQuake* is running on their S3 ViRGE, "If it just supported D3D..."

I didn't know any better two years ago, before I used OpenGL. I clearly remember laughing about this e-mail saying how OpenGL is going to take over the world, and there are going to be OpenGL accelerators in the consumer space, and anyone would be able to write stuff on those. And I was laughing because the misconception I had was, "Yeah, anyone that runs a $50,000 SGI workstation." Something that's appropriate there just can't be efficient, because they're throwing all this hardware at it.

And I was just wrong.

I just didn't know the issues and I learned better. And a lot of game developers haven't been in the position where they've had the opportunity to learn some of these things and they just take what's available and it's been bad. It's bad for the industry that what's available hasn't been as good as it should have been. But people really don't know there's an option.

Hook People point out how OpenGL is designed on high-end workstations, but

Fragging on the Jobs

St. John ***Will there be a Mac version of* Quake 2*?***

Carmack *Quake 2* is not going to be on MacOS 8, because I'm taking my idealist stand and saying *Quake 2* will be available on Rhapsody. Give up the crusty old Mac stuff! I'm going to personally port the stuff to Rhapsody and make it a high-quality implementation for people that want to take a step into the future of Apple. I have no respect for the MacOS, none at all.

There's a chance that if Apple doesn't curl up and die and Rhapsody turns out to be everything that it looks like it's going to be, then next year we might jump ship and develop on Rhapsody and port to Windows. There's a lot of good reasons to not have your target platform be your development platform. It keeps you from accidentally doing things that aren't robust and portable. And that was one thing during *Doom* and *Quake* we developed exclusively on NextStep because cross-compiles were ported to DOS.

St. John ***Apple didn't come to you and say "Please put* Quake 2 *on Rhapsody"?***

Carmack I have some issues with Steve Jobs. When he was running Next, I tried so hard to get any publicity I could for Next but, from what I hear third-hand, Steve Jobs just was not interested in any of that. And it's defensible in a workstation company, although it still would have been good free PR that they could have used. But I'm getting the vibe that he's squashing some things that are important at Apple, and he has no justification for doing that in a consumer operating system company. I've never met him—I'd like to some time, but I don't think he's exactly on my side.

keep in mind that the "high-end" workstation OpenGL was designed on didn't even have hardware texture mapping. And a lot of them are significantly less powerful than a Pentium 166—even today.

Carmack So it's like they had all these years of evolution and we're now at a point where we can say "They've spent a lot of time getting it to work on this hardware. And now our hardware is pretty damn similar. Let's just take all this. Let's not re-invent everything."

And if you're going to re-invent the wheel, don't make it square.

Quake: De-Optimized for Non-Intel

St. John What about non-Intel processors, what do you think of them?

Carmack The floating-point issue has really hurt them. We had AMD and Cyrix down here while we were developing *Quake*, and we said, "Look, floating point's going to be important," but because there weren't any benchmarks or any applications they'd used at that time, they brushed it under the rug.

AMD and Cyrix both have non-pipeline FPUs, which is their Achilles' heel. In terms of integer performance a lot of them are on par or, even in some cases, better than Intel, but we optimize for Intel because the Pentium's got the FXCH change trick to pipeline all these things. And it's pretty tweaky but it pervades all of our assembly language code for *Quake*.

So we're de-optimized for non-Intel chips, but it was the only sensible thing to do.

Hook Intel was the best processor at the time. The K6 had not shipped yet, so it's hard to optimize for the K6 or the Cyrix M2 or whatever. They just didn't exist yet. So it's not favoritism towards Intel, it was just being pragmatic.

St. John What would you think if SGI were to find a way to ship a PC version of OpenGL with Microsoft and doing the NT license for that workspace?

Hook I personally can't believe it. It's a rumor. When it becomes a reality, I'll stress about it.

Carmack We have like plan A, B, C and D on what could happen with OpenGL.

The best plan would have been if Microsoft played ball and got behind us. That would have been best for everybody. But it didn't happen. So plan B is working with SGI. And if that falls through, the other ones probably really aren't worth pursuing as a long-term strategy. It would be strictly a rear-guard action.

If Microsoft does manage to effectively squash SGI's involvement, it may be time to pack up and move on.

St. John Brian, what do you think of 3Dfx's future prospects now that you don't work there?

Hook I've always felt 3Dfx will do amazing stuff. I keep hearing rumors that there's political stuff in the semiconductor industry that will always hold small, fabless semiconductor companies like 3Dfx back. But I can't comment on that because I don't know enough to really say if that's a factor.

But remove that from the equation and I think 3Dfx Voodoo is *still* the best. Now that everybody's gone through multiple generations, this one architecture has lasted for a year. The boards are $180 for a 6MB version now, and you can get others for $150, and it's still competitive with brand new chips coming out from Invidia and Rendition.

Carmack They had a 4x performance lead when they came out. That is just so rare, they need to be lauded just for doing that, because it was an amazing thing.

Now I don't think they're going to have a 4x performance lead in the future, because eventually everyone is going to be working with the same memory subsystem, the same type of SDRAM, but I think they're still going to maintain a good 2x lead—and it's because they're really damn good. And I think they'll be successful. I don't think they're going to put S3 out of business, but I'm happy with the performance.

St. John That's a pretty strong statement. What don't you like about S3?

Carmack Well the ViRGE was the whipping child of the 3D industry because it was so bad. Just like 3Dfx was so good, ViRGE was *so bad*.

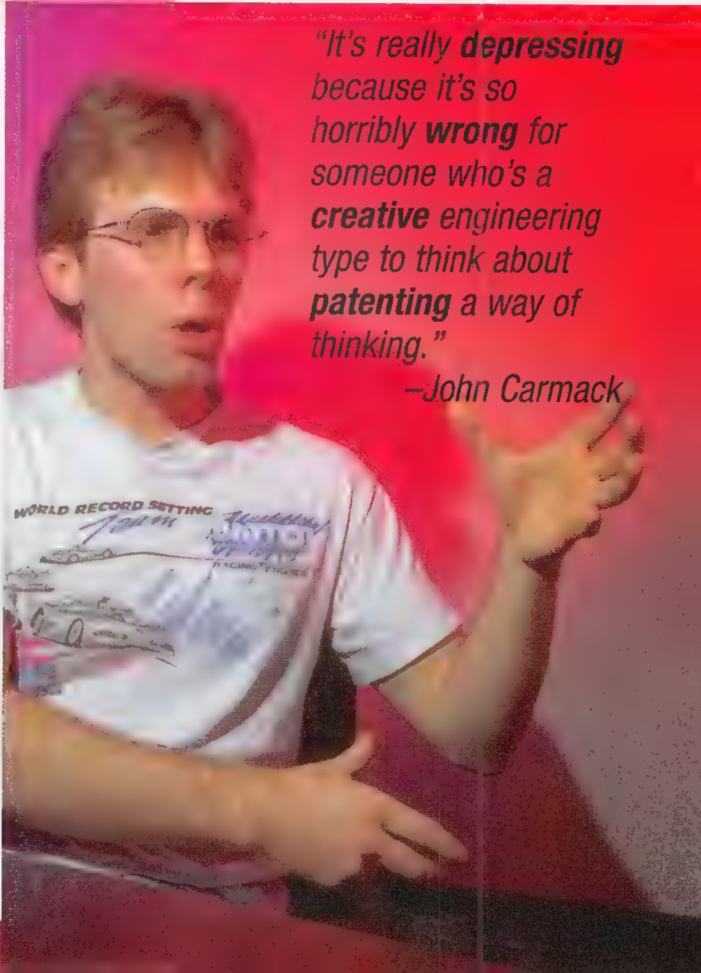
St. John You're pretty hopeful that S3 isn't going to be predominant in the marketplace?

Carmack Well anyone can turn it around. We've got a wonderful example with NVidia. The NV1 was the most stupid, wrong-headed thing anybody could have possibly built at that time. It was so bad it would have poisoned the industry if it had become a predominant thing—it was horrible. And now NV3 is probably the single-best chip solution available right now. They did the wrong thing, they recognized it, and then they did the right thing. So S3 may very well do that. I hope they do because they certainly still have a commanding presence and I just want lots of good chips in lots of people's hands, but I don't want lots of lousy chips in people's hands.

And it was funny, id Software had written off 3Dfx because when all the chip vendors came down and paraded through, 3Dfx said, "We're going to be $400." And we said, "You're not relevant!" We were behind Rendition because we felt they had the right feature set and they were going to be at the right price. But then RAM prices tumbled and, all of the sudden, 3Dfx is relevant. And not only are they relevant, they're so much better!

Memory is now cheap enough to use aggressively for graphics... and that's why 3Dfx is viable. If memory hadn't gone down, I'm not sure 3Dfx would still be in business.

Hook 3Dfx's original business plan was not predicated upon having any presence in the consumer space for the first couple of years. They were going for massive arcade sales in order to keep the business going. Then they could get the prices down and



> "It's really **depressing** because it's so horribly **wrong** for someone who's a **creative** engineering type to think about **patenting** a way of thinking."
> –John Carmack

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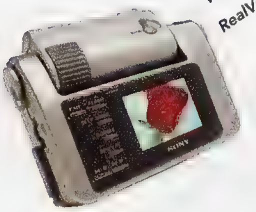

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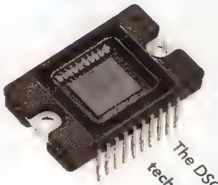

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work out the technology necessary to run in only two megabytes. But when the bottom fell out, all of a sudden 3Dfx was a consumer company. The arcade stuff became irrelevant, and they spun-off their board division, Quantum 3D, because it's like, "We need to focus on the consumer space. This arcade stuff is not going to be nearly as important to us now as we thought it was going to be three years ago." It was smart because if you're just selling chips into arcades, the volumes are nothing. And 3Dfx makes the same amount of money whether they're selling chips to Gateway or Dell or Compaq as they would if they were selling to Konami or Midway or whoever else.

Carmack Well, that's one of those things that I can just look back on. I thought it was too expensive for us to be paying a lot of attention to consumer boards. But a lot of it was us believing what these people were telling us about their board's performance. Everyone said "Oh, we'll do 25 to 33 megapixels"—and we believed that!

Hook They were running their SGI software emulation of what they would be capable of rendering.

Carmack And 3Dfx was saying "We'll do 45 megapixels" and we thought, "they're only 50% faster than these people but they're twice as expensive" and it's just not worth it. Then it turned out that the prices changed, everything became a lot cheaper. And everyone else underdelivered. And 3Dfx did not. They did what they said they would do and they did it well.

St. John ***What do you think of Intel buying-up interest in the major 3D chip companies?***

Carmack Intel's a smart company, and Intel's turning themselves into this gigantic, monolithic company has been good for us. We have benefited very strongly by Intel's ramming through things like PCIs, taking over the motherboard chip and the L2 caches. Because every time they've done something like that, our life has gotten better, our systems have gotten more stable, more standardized. And they're moving into the 3D market with their Auburn part and I think that's going to be great. I think they're going to do a solid job. And if Intel murders S3, I don't think I'm going to shed too many tears. If we get a better part from a reliable supplier that's going to be on the motherboard of everything, wonderful!

Hook And contrast that with Microsoft. You have two companies in similar positions: One in software and one in hardware. Intel is doing the right thing. PCI was better than VLB. Them owning the chipsets is a smart thing. They're doing CPUs that no one even thought technically possible with an x86 architecture. Contrast that with Microsoft, which has just made a habit of screwing things up. Making good business decisions, but screwing things up technically. If Microsoft was like Intel, it would have adopted OpenGL.

St. John ***I heard a rumor that id had a deal with Rendition requiring you to support their API only and that you couldn't ship anything else, except OpenGL.***

Carmack Oh, OK, yeah. Originally we didn't have anything in place when we did *VQuake*. And in the end, my God, that took far more effort than we expected because of the performance required. The performance was really only good in some situations, and not the situations that it turned out we had to use, which included Z-buffering.

St. John ***So what Verite chip problems are you responsible for...?***

Carmack We were originally saying, "Z-buffering is important but you shouldn't have to run all these other APIs and everything, so *Quake* is not going to do Z-buffering." I said that and they probably still have the e-mail. And then halfway through *Quake* I said, "Well I changed my mind. We are using Z-buffering, even in software, because it turns out that it's the most effective thing for us to do."

And they're like "Oh great. We have Z-buffering, but it runs at half the speed of our non-Z-buffered algorithm." We did finally get *VQuake* running on their 3D stuff, because all through *Quake* we were concentrating on, "OK, how are we going to hook out hardware for this?" But when we implemented it that way, the performance was just wretched, totally not acceptable, even at low resolution.

We did finally get good performance out of *VQuake*. And I still find that a technical accomplishment. We took an architecture that had certain strengths and we leveraged it as well as was possible.

St. John ***Did you sign a contract restricting what kinds of technology you could do ports for?***

Carmack We got some bundled deals, some things. Rendition offered us... I don't even know exactly what the specifics were, but I think there was like some stock involved or something, if we would sign an exclusive hardware agreement for a certain time frame. And we were looking at that saying "Well, we're not going to do anything else in that time frame, so we might as well."

St. John ***So that agreement stated that you can only ship 3D-hardware-accelerated***

"This is my view of the people who work at Microsoft: You have a **choice**. You have to realize that what you're doing is bad for the industry. If you're doing stuff that you don't even agree with and you do it for the **money**—we have a word for that: **Whore.**"
—Brian Hook

software for a Rendition chip?

Carmack It was like no chip-specific ports or anything inside the space of three months or something. The only thing on the radar at that time was a Glide port. And I was like, "Well, maybe we could be talked into doing this because it *is* really cool." There's all this disinformation saying I did *GLQuake* for 3Dfx. In fact, I did it because I have an Intergraph workstation in my office that runs OpenGL and I wanted my game on my workstation. And 3Dfx was like, "You know, we could just write an OpenGL subset that catches all that and it will run on our hardware."

St. John ***So the only way 3Dfx could get* Quake *running on their hardware was to write an OpenGL driver, because you could only ship an OpenGL version?***

Carmack I forget exactly what the timing was on all this. We talked about letting them do a Glide port because they had a lot of the work done and we figured we'd give them the codebase and probably wouldn't even have to be involved in it much. But there were issues with the Verite port—if I could go back in time, I wouldn't have done it. It was too much work, too much distraction for Michael Abrash. And we were afraid of that happening again with another proprietary port. But the OpenGL stuff seemed to be the right thing.

And when I did the OpenGL version, I realized that even with all this sweat and labor, the Verite version was just awful—the OpenGL version was a pleasure to do.

I tried just a couple of features, like transparency or shadows and reflections. And they just dropped in—it was so wonderful. And that was what really got me crusading for OpenGL. It was like, "This helps me. This is not me laboring to produce something to deliver to the consumer. This is something that's letting me be more creative and try out more things to produce a better architecture than we would have had otherwise." And at that point I went and tried D3D and found out that it wasn't helping me do creative things. But I really learned something: A good API can help you produce better products.

St. John ***How important is software rendering to games these days?***

Carmack I don't think software rendering has a future, especially once the hardware people get their shit together and are actually helping us instead of being this anchor that you get paid to support, like it is right now.

Trinity will not have a software renderer. Guaranteed. Well, theoretically you could have a software renderer, if you hook that up as an OpenGL bag. And who knows, maybe processors with unique architectural features will make it possible to do hardware-like rasterizing on a software level, but I doubt we'll have a pixel-level interface.

Now that means giving up a

LIP continues >142

Signed in Blood

St. John How do you handle third-party developers when you license your engines?

Carmack It's, "Here's a CD. Thank you for the half-million dollars. Have a nice life."

St. John Any truth to the rumor that Mindscape's upset about their licensing deal with you guys right now?

Carmack Mindscape had the very first *Quake* license and they signed a really nice contract where they got the codes, development, everything for cheap. They never got a team together and now they're trying to say, "Well, we don't want to pay you this last $200,000 because we didn't do a game." And we're like, "Tough luck. You signed a contract. That's your fault."

"D3D **sucks**! Over the years, **Microsoft** will make D3D suck less, but they're **dragging** us through the **mud** along with them as they figure it out." –John Carmack

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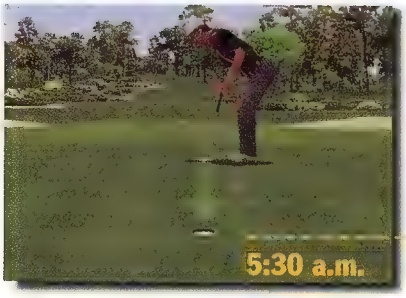
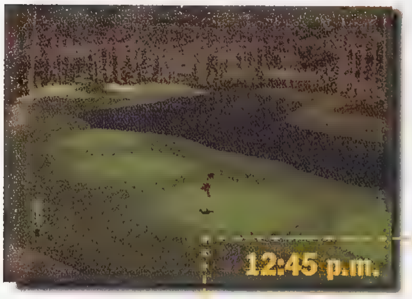
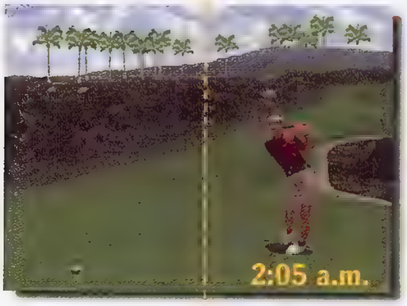


Ireland's Mt. Juliet



Monterey Bay



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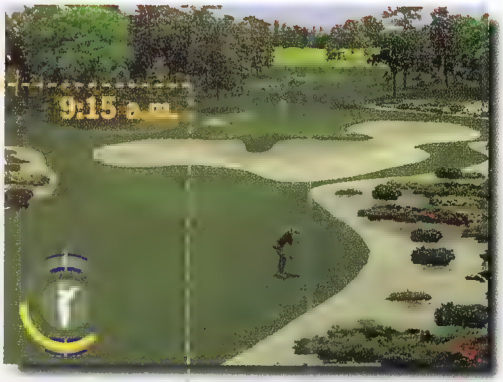

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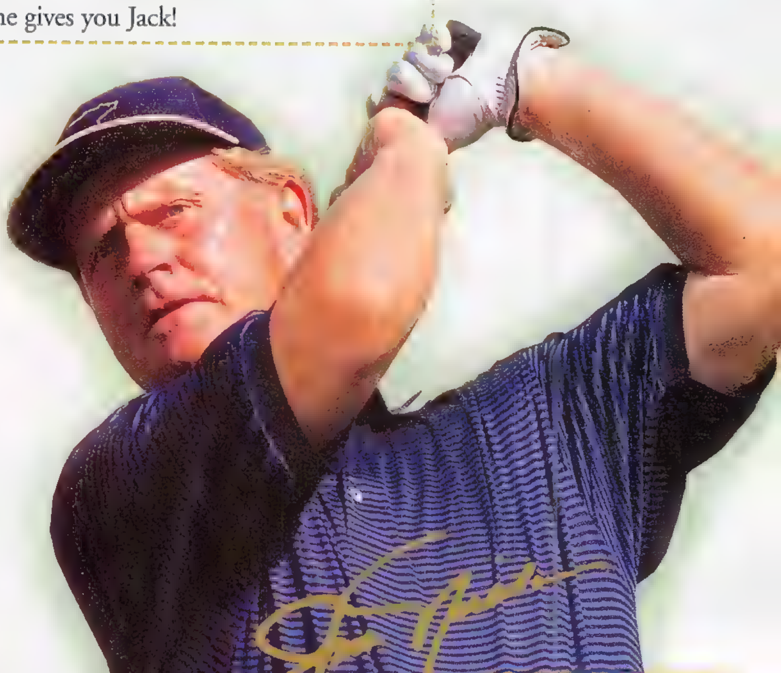

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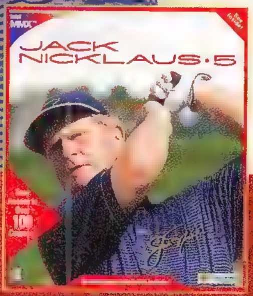

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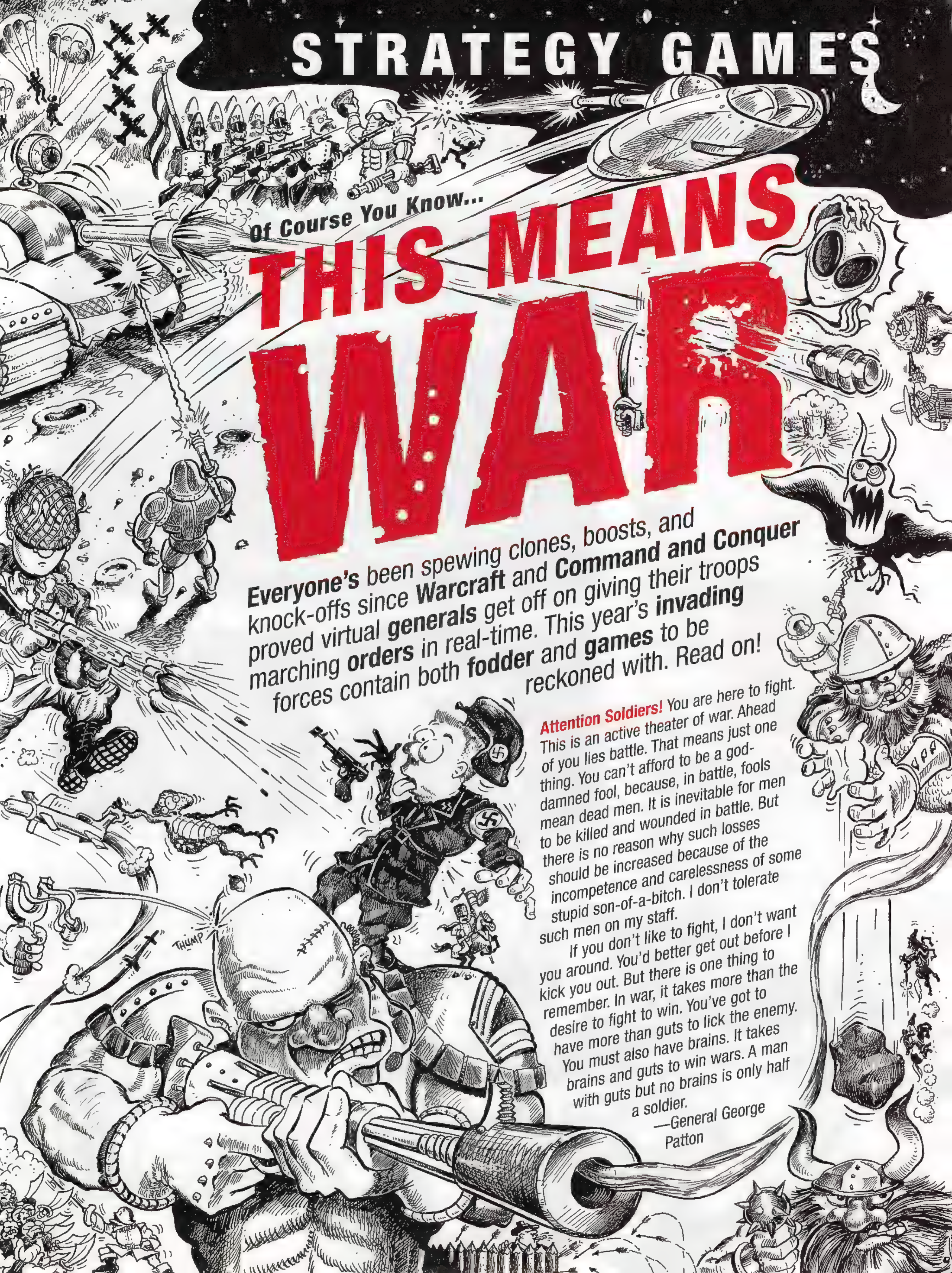


Of Course You Know...

THIS MEANS WAR

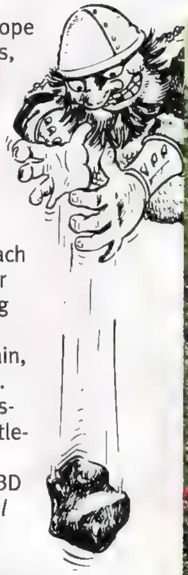
Everyone's been spewing clones, boosts, and knock-offs since **Warcraft** and **Command and Conquer** proved virtual **generals** get off on giving their troops marching **orders** in real-time. This year's **invading** forces contain both **fodder** and **games** to be reckoned with. Read on!

Attention Soldiers! You are here to fight. This is an active theater of war. Ahead of you lies battle. That means just one thing. You can't afford to be a god-damned fool, because, in battle, fools mean dead men. It is inevitable for men to be killed and wounded in battle. But there is no reason why such losses should be increased because of the incompetence and carelessness of some stupid son-of-a-bitch. I don't tolerate such men on my staff.

If you don't like to fight, I don't want you around. You'd better get out before I kick you out. But there is one thing to remember. In war, it takes more than the desire to fight to win. You've got to have more than guts to lick the enemy. You must also have brains. It takes brains and guts to win wars. A man with guts but no brains is only half a soldier.

—General George Patton

Total **Annihilation**



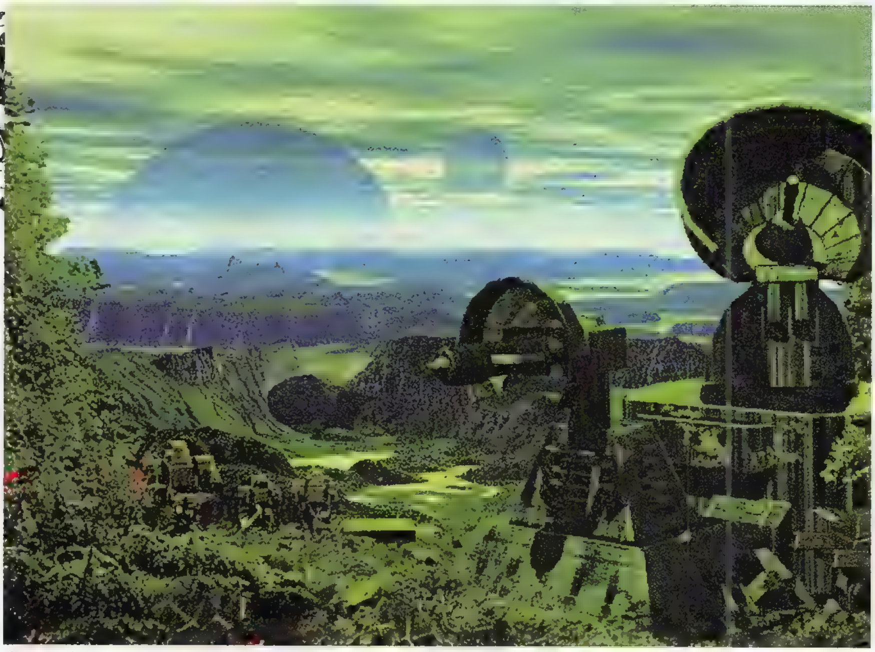
Pushing the graphics envelope for real-time strategy games, *Total Annihilation*'s isometric mech-fest breaks new ground by using a 3D polygon engine to render units. Although the map is a large static bitmap, *Total Annihilation*'s terrain system calculates each 3D vehicle's accurate vector on the map by interpolating the surface value to give the illusion of true 3D terrain, much like voxel technology. And the more RAM your system has, the larger the battlefields are.

The downside to going 3D is the lack of detail in *Total Annihilation*'s textures; just compare them to the latest third-generation sprite engines, which are only limited by the frames of animation.

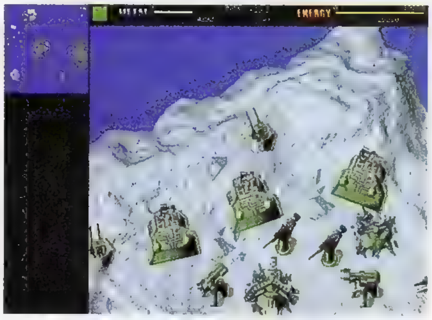
CHECKLIST

Maximum Resolution/Color
800x600/16-bit
MS-DOS
Win95 Native
DirectX
Multiplayer
Modem IPX (8 players)
Internet

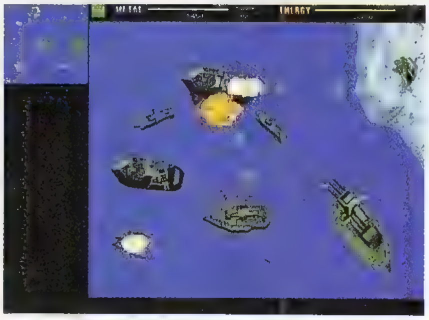
The 3D engine also allows you to download new units, but the AI—which not only responds to repeated strategies, but also initiates its own—keeps *Total Annihilation* from being just another standard build-and-destroy midnight oil-burner.



A tranquil alien world is the battlefield where mechs will clash to the death in Total Annihilation.



3D modeled terrain makes Total Annihilation*'s action that much more realistic.*



Combat takes place over land, sea, and air.

The too-epic-for-words CD-audio string orchestration soundtrack belongs more in an Oliver Stone movie than a game—it's that stirring.

The only problem lies in the mechanical units themselves; there are no friendly "What izzits" or "Yes, milords" when you choose a unit, and somehow, you feel less guilty about loosing a phalanx of missile-launching mechs than a brigade of human soldiers.

The advantages of 3D runtime have yet to be fully realized, but *Total Annihilation* is a logical step in the evolution of the real-time strategy genre, and the best real-time strat game of the year.

Price $45
Developer Cavedog
Publisher GT Interactive
Phone 800.469.5961
URL www.gtinteractive.com

boot verdict
9

ILLUSTRATIONS BY SCOT PECK

Universal *Real-Time* Strategies

***Target** enemy harvesters and gatherers: The fastest way of forcing your opponent to heel is by cutting off his resource production. Novice players tend to overspend and inadequately protect their resources.*

***Secure** a defendable position for your Construction Yard/Command base. When choosing a location for your base, always take accessibility and vulnerability into account. Using terrain, try to limit the ways into your base compound as much as possible.*

***Maintain** knowledge of map terrain and encroaching enemies. Information is key! Always scout the maps to reveal as much as possible. This will allow you to always know where a potential attack is coming from, and what type of terrain you must deal with in case you wish to launch your own attack.*

*Use **combined arms** tactics whenever possible; always build several types of units in your attack force. For example, along with tanks, build fast support units, such as infantry or bikes, as they are the ones that tend to deliver the death blows. This is because your opponent is always going to attack the tanks first, while not paying respect to the swarming smaller units, which will fire unopposed. Combine this with some air support to target your opponents' more powerful defenses, and you'll have the advantage.*

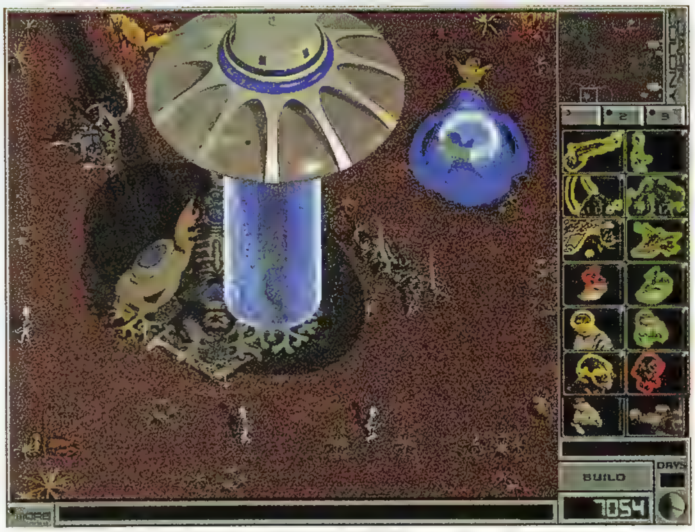
***Protect** your harvesters and gatherers with guard units. Protecting your own lifeline is the fastest way to cripple novice players.*

***Advance** your technology as quickly as possible to increase the attack/defense values of your units. Don't get stuck in the "I must out-build my opponent" mode.*

***Maintain** a strong base perimeter. Fortify your base and any critical structures with guard units or devices such as towers and bunkers. Again, use surrounding terrain for the best possible defense.*

***Always** attempt to capture your opponent's structures. Not only are you denying them from your opponent, but you can sell them to get additional resources.*

Dark Colony



The menu on the right lets you upgrade weapons and armor. Here, the alien base refortifies itself.

CHECKLIST

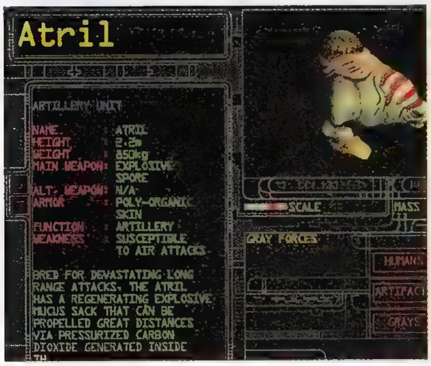
Maximum Resolution/Color
640x480/16-bit
Win95 Native
DirectX
Multiplayer
Modem IPX (8 players)

With one of the fastest hi-res isometric sprite engines around, *Dark Colony* pushes the gore and visual violence threshold. *Dark Colony* also takes you to the limits of sensory overload with independent light-sourced explosions, vivid multi-frame animation, and an overkill of sound effects.

Set in a not-so-distant future where mankind must fight Roswell's ever-friendly alien greys for control of Mars, *Dark Colony* allows you to play as either the Humans or the Aliens. Gameplay is based around a series of missions, which are linked together by your avatar. Although you must gather resources, there's no annoying "harvester" problem of collecting and processing resources with the same vehicle.

The game also promotes leadership: As the squad leader, you must motivate your troops into a frenzy. Although unique, the leadership angle has little effect in the game, besides adding a light sense of role playing.

With a variety of units, upgrades, and technology, *Dark Colony* is a decent value for your gaming dollar, feeling like a real-time version of the original *X-Com*.



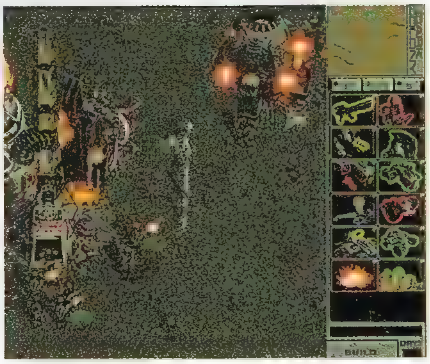
Atril

ARTILLERY UNIT

NAME : ATRIL
HEIGHT : 2.2m
WEIGHT : 850kg
MAIN WEAPON: EXPLOSIVE SPORE
ALT. WEAPON: N/A
ARMOR : POLY-ORGANIC SKIN
FUNCTION : ARTILLERY
WEAKNESS : SUSCEPTIBLE TO AIR ATTACKS

BRED FOR DEVASTATING LONG RANGE ATTACKS. THE ATRIL HAS A REGENERATING EXPLOSIVE MUCUS SACK THAT CAN BE PROPELLED GREAT DISTANCES VIA PRESSURIZED CARBON DIOXIDE GENERATED INSIDE TH

The encyclopedia lets you see the capabilities of the units, such as for this alien artillery unit.

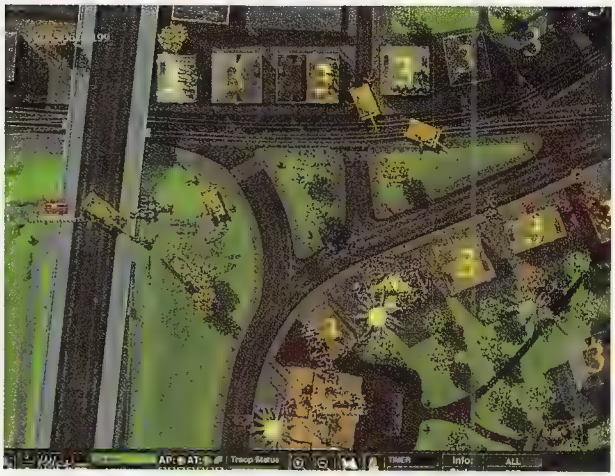


As alien troopers and Sy demons attack the human base, a human ship drops off reinforcements.

Price $45
Developer GameTek
Publisher SSI
Phone 408.737.6800
URL www.darkcolony.com

boot verdict 7

Close Combat 2



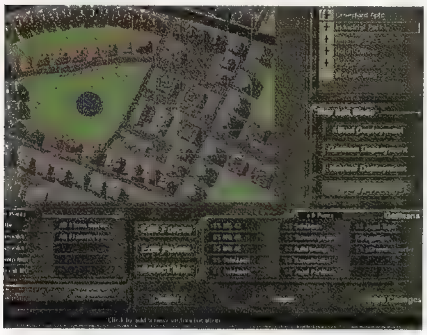
New to Close Combat 2: multiple elevation levels, including hills, valleys, and buildings.

Johnny get your gun 'cause Microsoft's turning back the clock to 1944 with *Close Combat 2: A Bridge Too Far*, which covers a single campaign in detail. In addition to improving the original *Close Combat* engine—which was the first real-time game to extensively track morale, motivation, and psychological factors—Atomic has combined a well-polished interface, smooth transitional info screens, and FMV cut scenes.

CHECKLIST

Maximum Resolution/Color
800x600/16-bit
Win95 Native
DirectX
Multiplayer
Direct/Serial (2 players)
Modem TCP/IP (2 players)
Internet (2 players)

Choose your commitment level: training, single-battle, battle zone (composed of a few missions), or the entire campaign. Once you've selected your mission and checked your carbine, you're propelled into a richly populated 800x600 battlefield (this resolution is required to play the game). *Close Combat* veterans will recognize the familiar gameplay and style. The sequel suffers from the same feeling of shoveling troops into the meat grinder without much control or association with them.



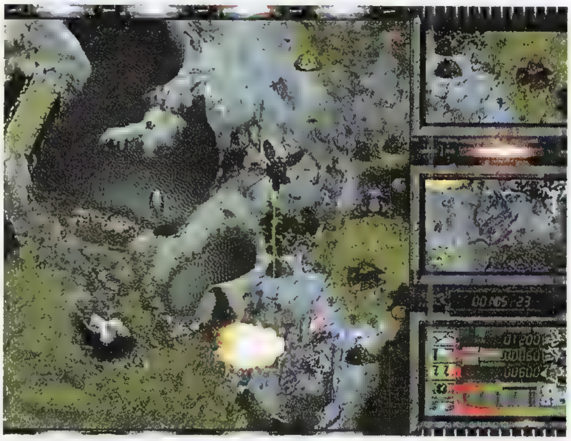
The new Battlemaker creates custom battles by setting victory locations, initial force mix, and requisition points.

One of the game's best features is the Battle Generator, which allows you to create an infinite number of scenarios. Your successes and failures carry over from one battle to the next, affecting future missions as you proceed through the campaign. And with the inclusion of every battle formation employed in the real-life military campaign, *Close Combat 2* is braced to lock horns with even the best wargames.

Price $54
Developer Atomic Games
Publisher Microsoft
Phone 800.426.9400
URL www.microsoft.com

boot verdict 8

Conquest **Earth**



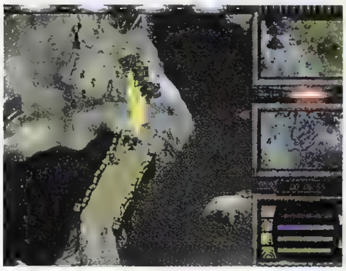
A laser satellite wreaks havoc on the alien base, producing a giant fireball.

Conquest Earth smashes into the real-time strategy category. A versatile isometric sprite-based engine drives this gem's graphics muscle, allowing you to run either DOS or Win95 at 16-bit or 32-bit, depending on your system specs. Ignore the listed low-end requirements of P90 with 16MB RAM. If you're stuck in this system slum, the graphics load will require the native DOS mode—even with an add-in video card.

CHECKLIST

Maximum Resolution/Color
640x480/16-bit High Color
Win95 Native
MS-DOS
Multiplayer
Direct/Serial IPX (2 players)

Conquest Earth features all you'd expect to find in today's third-gen real-time strategy designs: predetermined AI strategies and tactics, and multiple waypoint selections. The hi-res interface includes three viewports to see what's going on in the battlefield—simply designate roving units and they'll send video back to your HQ. No longer do you have to scurry madly around the battlefield checking the action!



Flame tanks defend the human base against an alien attack.

Unfortunately, even killer direct unit control is overshadowed by glaring bugs. Installing the game under DOS in any subdirectories other than the root deletes all the data in the subdirectory. Eidos says a patch is expected shortly.

With eight-way multiplayer, large maps, and the unique "camouflage" ability of the Martians, *Conquest Earth* has all the right stuff —but a clumsy interface is its Achilles heel.

Price $45
Developer Data Design
Publisher Eidos
Phone 415.616.2022
URL www.eidos.com

boot verdict 5

STRATEGY GAMES

***What** makes a **Great** Real-Time **Strategy** Game?*

Kick Ass real-time strat games are a combination of diverse elements, from great art to amusing animation to killer gameplay.

Central to all these elements is the AI that holds a game together.

A great game may employ any of the many different AI techniques available, such as Trigger Logic, Logic Trees, Fuzzy Logic, and Neural Nets.

*Most games use **Trigger Logic**, which was used with great success in* Command & Conquer. *The programmer creates a tool or editor that allows the game designer to place objects and units, and establish logic points or zones of influence that trigger specific events.*

***Logic Trees** are the little brother of Trigger Logic, and the two methods of AI are almost always found together. Logic trees attach an established set of actions/reactions to each unit. So when your mobile assault tank is on "Defend" orders and is attacked, its response is to fire the appropriate weapon, based on the pre-programmed kill solution.*

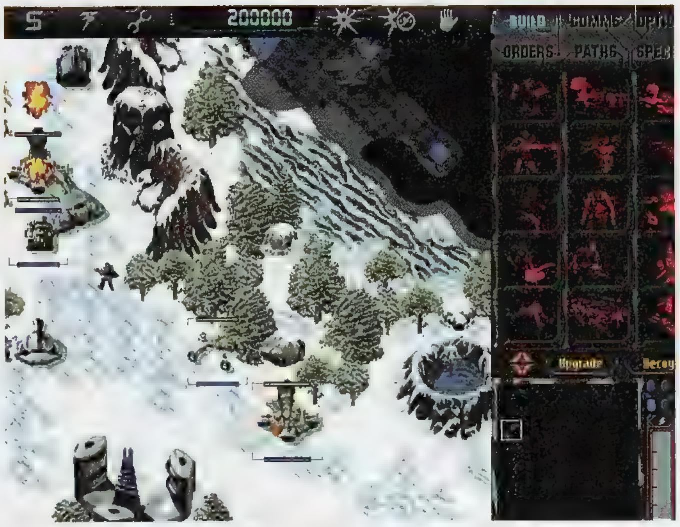
***Fuzzy Logic** is a relatively new concept behavior based on a set of pre-defined values that are influenced by a constantly changing set of variables. This makes units function consistently most of the time, but allows them to follow a different course of action at other times, based on these variables. This approach is found in more sophisticated AI games, such as SimCity 2000 and Creatures.*

***Neural Nets** are shrouded in mystery, and many in the industry speculate that this technique may be the holy grail of AI. Neural nets attempt to account for every possible action/reaction by assigning numerical values in a series of extensive data structures. What makes neural nets so interesting is the possibility of independent reasoning. Unfortunately, these data structures "learn" slowly, and the cause and effect modifications needed for even the most basic elements of thought would take years to build up. The reality is that someone must spend years programming reams of the initial data into a neural net, so someday it may move an inch on its own.*

Given this, few games attempt to implement even derivative technologies, and given the excessive data, time, and technology neural nets require, it'll be a long time before this approach actually appears in its pure form.

*Recently, developers have rushed out games stuffed with multiplayer options, but crippled with limited AI. This is called the **Multiplayer Crutch**, where AI becomes secondary and single-player modes suck.*

Dark Reign



3D terrain effects let you prepare for ambush by hiding equipment, such as the spider bike obscured by the tree.

Reinforcing a smooth windows-based system, *Dark Reign* sports new features such as predetermined AI strategies, multiple waypoints to outwit your opponents, and the ability to ally, which lets you share resources, units, and information with other players.

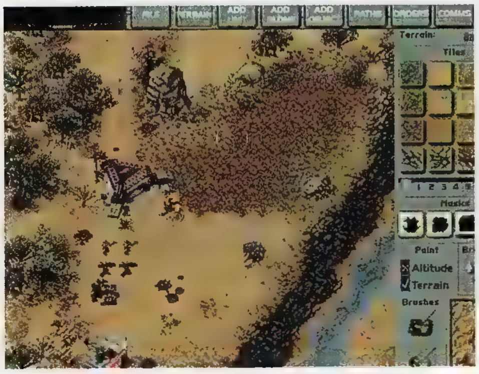
CHECKLIST

Maximum Resolution/Color
640x480
Win95 Native
DirectX
Multiplayer
Direct/Serial (2 players)
Modem (2 players)
Internet (4 players)

Dark Reign deftly avoids the pitfall of poor single-player mode with a priority table for the AI: When not under attack, it first destroys your resource collection units, and then targets your vehicle construction facilities. While the AI is far from perfect, it does deliver plenty of competition. Unfortunately, single-player games can turn into battles of attrition rather than strategy. There's also game balance issues, where either some units are destroyed too quickly, or the weapons are just too powerful.

Some companies sell a Map Editor/Scenario Generator months after shipping a game, but *Dark Reign* ships with a full-featured editor to create custom campaigns.

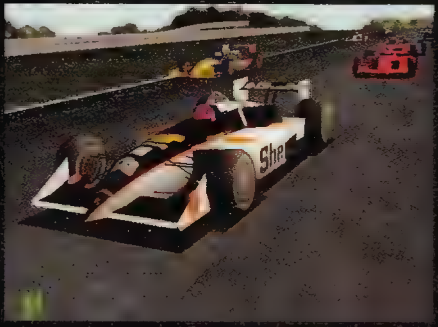
Combine this with a large selection of units with distinct abilities, and you've got a strong product. —*Manny Granillo*



A powerful mission editor constructs game scenarios. You can set terrain and place units and buildings.

Price $45
Developer Auran
Publisher Activision
Phone 415.255.2000
URL www.activision.com

boot verdict
7



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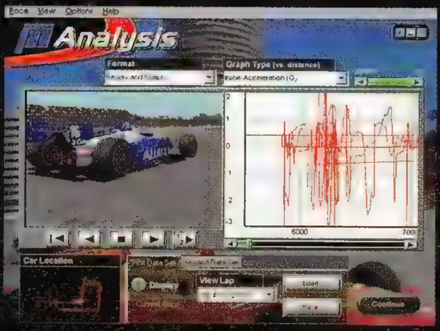
Current: 0: 18.72
Best: 0:00.00


Race View Options Help
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Car Location
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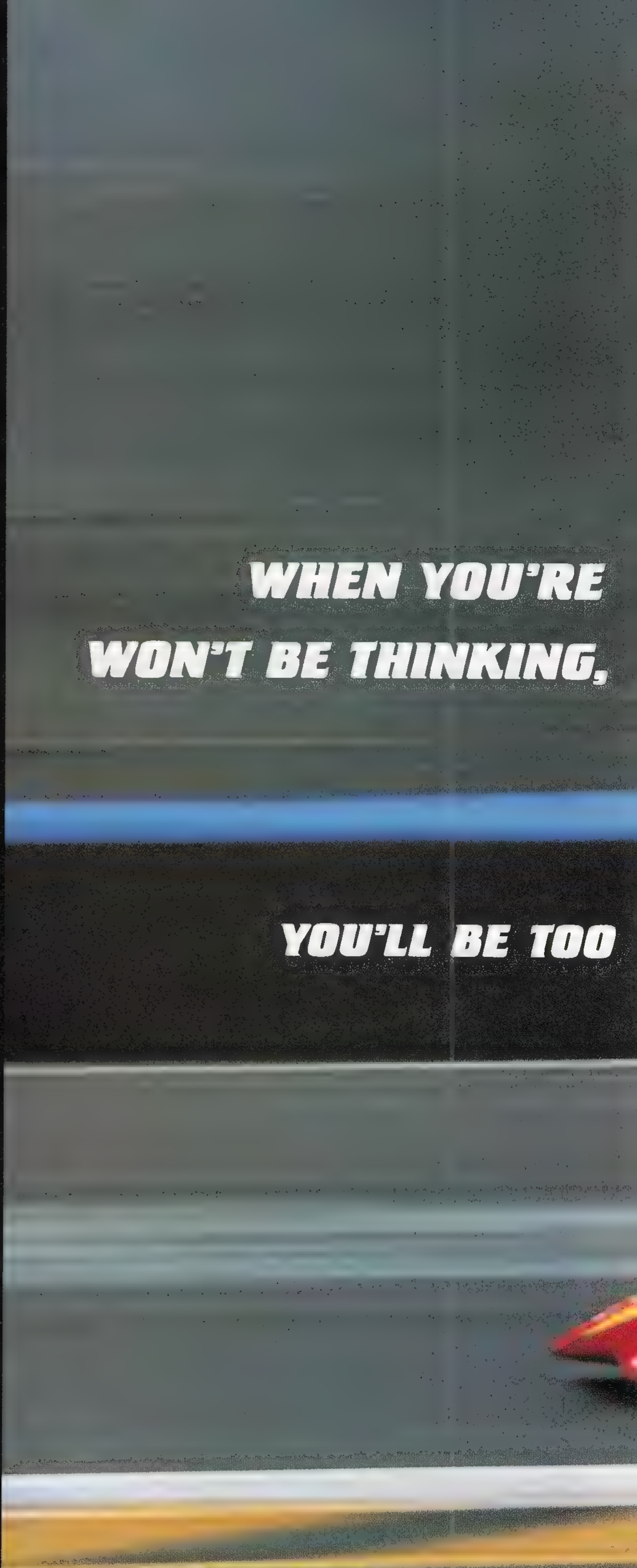
WHEN YOU'RE
WON'T BE THINKING,
YOU'LL BE TOO

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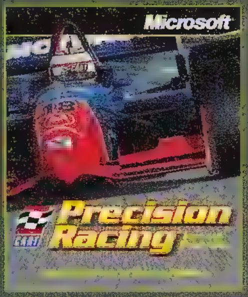

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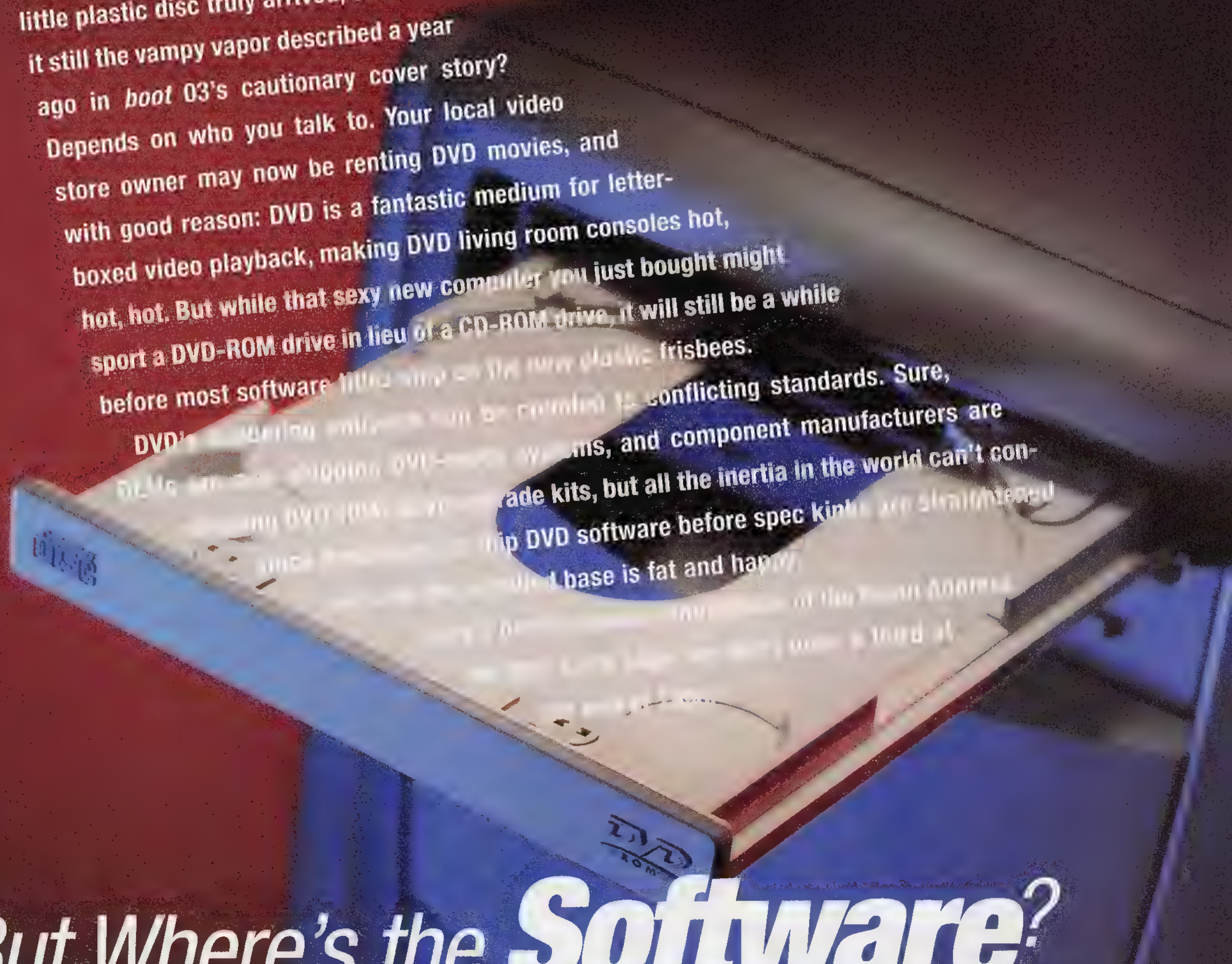
DVD!

Promising gig upon gig of **storage capacity** and **awesome versatility**, DVD will **wipe out** CD-ROM, CDR, CDRW, LaserDisc and every portable media format **ever** created—when the specs are **hashed out** and software **actually** begins **shipping**

The **Hardware** Has Arrived…

Offering up to 17GB of storage space, DVD is one of the most publicized digital breakthroughs of 1997. But has the little plastic disc truly arrived, or is it still the vampy vapor described a year ago in *boot* 03's cautionary cover story? Depends on who you talk to. Your local video store owner may now be renting DVD movies, and with good reason: DVD is a fantastic medium for letter-boxed video playback, making DVD living room consoles hot, hot, hot. But while that sexy new computer you just bought might sport a DVD-ROM drive in lieu of a CD-ROM drive, it will still be a while before most software titles ship on the new plastic frisbees.

DVD's [illegible] can be [illegible] to conflicting standards. Sure, [illegible] shipping DVD-[illegible] systems, and component manufacturers are [illegible] upgrade kits, but all the inertia in the world can't con-[illegible] ship DVD software before spec kinks are straightened [illegible] base is fat and happy. [illegible]



But Where's the **Software**?

by Tim Tully

Photograph by Aaron Lauer

*What the **Feck** Is DVD, Anyway?*

DVD—Digital Video Disc or Digital Versatile Disc, depending on whom you're asking—comes in a number of flavors. At its base, you have the disc itself, standardized by the 10-member DVD Forum (formerly DVD Consortium). This humble disc is little more than a piece of optical storage, holding between 4.7GB and 17GB of data. But when you start putting all this space to use, well, that's when the medium becomes exciting.

DVD video, the most straightforward and first-to-market of the DVD family, is basically a better vehicle for rental movie playback. In the United States and other countries that follow the National TV Standards Committee, it's spec'ed to play MPEG2 video and Dolby Digital 5.1 six-channel surround audio. DVD's data capacity allows it to hold 133 minutes of digital video formatted to those specs—enough to hold most Hollywood releases.

Audio Curveballs

The MPEG1 and MPEG2 video standards for DVD also employ a standard audio format. In countries that use NTSC video—such as the United States—it will be Dolby Digital (until recently called Dolby AC3). This might be a bit confusing for a couple of reasons. First, Dolby Digital is neither Dolby Pro Logic nor Dolby Surround—these are older formats used for other applications. Second, the spec is neither MPEG1 nor MPEG2 audio, which are high-clarity, efficient compression formats that you might logically equate with MPEG video.

Rather, Dolby Digital is both a compression format and a playback format, and a damn good one at that. Depending on your setup, Dolby Digital audio will automatically play back as anything from mono to six-channel sound (most often called "5.1," the ".1" referring to the sub-woofer channel, which is not a full-bandwidth channel).

The full appearance of 5.1 audio naturally depends on its marketability. Activision's Vice President of OEM Sales Brad Crystal says, "I would say only a small fraction of users will have 5.1 capability," adding Activision put the full six tracks in *Spycraft*, though not in *Muppet Treasure Island*.

DVD video looks and sounds a lot better than VHS, and can even beat LaserDisc quality if the right compression ratios are used. DVD video discs can also be premastered to add cool features you'd never find on tape: alternate cuts, multiple camera angles, and subtitles in different languages, all defined by user options. You also have the potential to choose the language of the soundtrack, and fast-forward and rewind via a menu of key scenes. Just don't get excited about a black market for duped discs: DVD video is encrypted to prevent pirated copies.

> "The **big** story is that there is a real **lack** of **standards** as to how DVD **titles** should be **written** to work on DVD **hardware**."
>
> *—Jonathan Schwartz, software licenser*

DVD video is definitely here. Its final hurdle was overcome last October when an industry agreement put CSS (Content Scrambling System) copy protection on the discs. Hollywood is feverishly pumping out movies, old and new, in the new format. Greg Berkin, Intel's DVD Evangelist, says, "Warner Brothers, MGM, Universal, Columbia Tri-Star and LIVE have released more than 120 DVD movies, and we expect more than 200 by end of year."

Keep in mind DVD videos are playback-only discs that are most comfy in set-top boxes attached to TV sets—though they will play in computer drives designed for their cousin, the DVD-ROM.

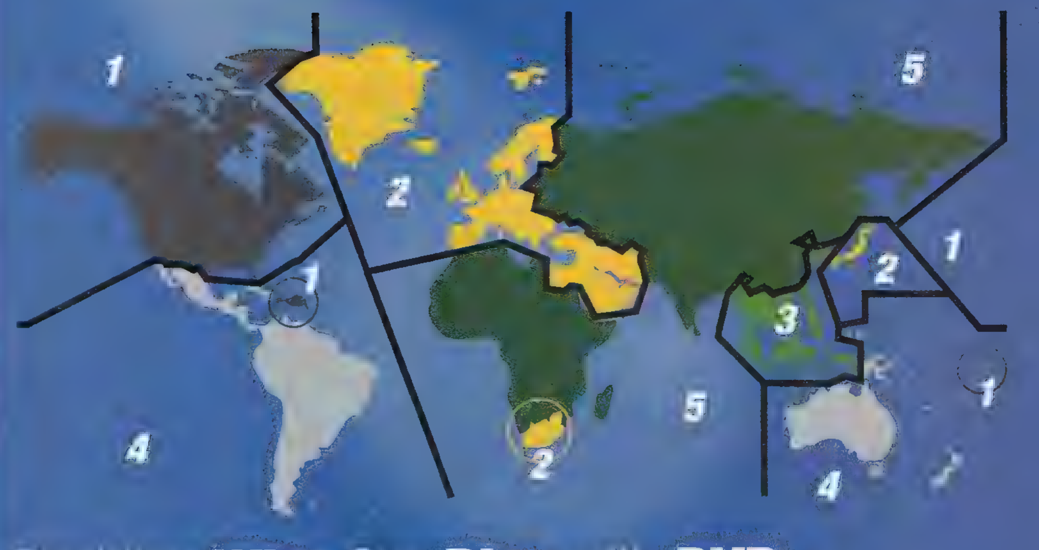
Of course, if you're a *boot* reader, you're most likely fiending for a DVD-ROM drive, which plays DVD-ROM software, DVD video, and regular-old CD-ROMs. Like its video kin, the typical DVD-ROM holds a massive 4.7GB. Dual-layer, dual-sided versions host 17GB. The potential for DVD-ROM to provide mind-shattering gaming experiences has fraggers frenzied, and we're confident the new format will eventually kill the CD-ROM just as the CD-ROM killed the floppy. But as we'll soon see, forces are at work keeping DVD-ROM in the holding pen.

Another family member is DVD-RAM, a rewritable version of DVD that was under the spotlight in *boot* 15's bootWire. Seems there's unrest in the DVD-RAM community: Sony, Philips, Hewlett-Packard, NEC, Ricoh, Yamaha and Mitsubishi have bolted from the unanimity of the DVD Forum to back a higher-capacity version of the disc. The rebels want a 3GB disc, versus the 2.6GB version still backed by Forum loyalists Toshiba, Matsushita and Hitachi. While this family spat has spawned hand-wringing over a possible redux of the Beta/VHS War, these fears miss the point. DVD-RAM is not an entertainment vehicle, but a storage format—more analogous to SyQuest, Zip and Jaz than to CD-ROM or VHS—and can coexist with all these formats without ruining anyone's day. DVD-RAM drives will play both DVD video and ROM software, but are at least a year away, and will always cost about twice as much as a ROM drive. After the initial price decreases (the first units should cost just under $1,000), the RAM drives will nicely serve double duty for those who need writability.

The other recordable DVD is DVD-R, a 3.95GB, record-once format for high-end mastering. DVD-R capacity is slated to reach 4.7GB within a couple of years. The recorders will principally serve in professional DVD software development environments, as reflected by the drives' projected $17,000 price tag (this number is expected to drop below $5,000 within a year). DVD-R is not a consumer product.

STARGATE
TWISTER
THE
TO

The DVD video standard offers LaserDisc-quality video and sound, soundtracks and subtitles in different languages, and menus of key scenes for precise fast-forwarding and back-tracking.



Deciding **Who** Can **Play** with **DVD**

DVD will definitely replace your CD-ROM drive—but what will it do for your pirate movie business? Not much, says Jim Taylor, author of *DVD Demystified* (McGraw Hill). "DVD has three different forms of copy protection," says Taylor. "DVD video players have a Macrovision 7.0 circuit that won't let you copy to videotape. The discs also have a serial Copy Generation Management System that prevents copies, or copies of copies. The third system is the Content Scrambling System—data encryption that won't let you read media files right from the disc. Also, the players have no unscrambled digital output."

Consumers should also be aware that most DVD discs are encoded to play back only on drives manufactured in five specific global regions. For example, if your $5 copy of *Supercop* was pressed in Hong Kong, it might not play back on North American hardware. The goal is to protect native DVD products from competing with foreign imports.

*Why DVD-ROM Discs **Aren't** Shipping*

OK, it's not difficult to burn four-plus gigs of ASCII text to a DVD-ROM for a boring library reference disc. Matters get squirrelly, however, when you're developing content that takes advantage of the medium's great multimedia features—MPEG2 video and Dolby Digital six-channel sound.

The DVD-ROM spec, you see, has no application layer. You can put anything you want on a DVD-ROM, from the entire globe's collective phone book to a multimedia extravaganza loaded with the best sound and video. Unfortunately, problems lie within video processing. MPEG2 requires decoding, either in software (an inefficient process) or hardware. Hardware decoding is currently processed by add-in decoder cards, but will eventually be built into video cards proper. But here's the glitch: There's no standard way for the DVD-ROM software to talk to the DVD-ROM drive and the card that decodes the MPEG2 video. This means a resounding lack of DVD-ROM games, which translates into a sluggish installed base (as we all know, games make the world go 'round).

Jonathan Schwartz, an independent contractor who licenses software to OEMs says, "The big story is that there is a real lack of standards as to how DVD titles should be written to work on DVD hardware."

Schwartz describes a conference held this July by Intel, in which DVD-ROM title developers were invited to test their software on different platforms, using different drives and decoder cards: "We went from room to room testing software on all the different combinations, and well over 90% didn't work. There is no standardization of [Media Control Interface] calls among programmers. They just guess at it, and the video card companies don't usually get it right."

"We **don't** have **any** retail titles **planned**. There's not **significant** enough an **installed** base to make it economically **feasible**."

—*Pat Becker, Electronic Arts*

As a result, the software doesn't work with the hardware.

Brad Crystal, Activision's vice president of OEM sales, is familiar with the situation. "Eventually, there will be a standard—starting probably early next year—with Microsoft's DirectSHOW," Crystal says. "[But the current absence of a standard] makes development more difficult. There is some guesswork—we have to test with each individual card. Either we have to reprogram, or we have to get the decoder card companies to alter their drivers."

Intel's Greg Berkin, a DVD evangelist, felt the testing was a success, if only because it sparked a stopgap measure. "We got a general consensus on 'bounding'—limiting MCI calls to some basic operations in software being developed before DirectSHOW arrives," he says. "This will ensure both compatibility in Windows 95, and a migration to future operating systems."

The current lack of standards throws cold water on software development, and the Catch-22 of a small installed base exacerbates the already cautious development air. Pat Becker, Electronic Arts' director of corporate communication, says, "We don't have any retail titles planned. There's not significant enough an installed base to make it economically feasible."

The strategy for other developers will be to bundle DVD-ROM titles with systems and DVD-ROM upgrade kits on which they've already tested. "For the immediate future, we're focusing on the OEM opportunities where we can ensure there's definite compatibility," says Crystal of Activision. "Once the driver issues have been worked out and the installed base is sufficiently large, then we can move to making these products available at retail, probably sometime in early '98. Late '97 is still possible."

Likewise, Electronic Arts' Becker says, "Through OEMs, we do distribute a DVD version of *Wing Commander IV*, remixed with MPEG2 and AC3. We don't do it as a retail item."

Though no one doubts the medium will succeed, DVD-ROM titles will be rare through the end of 1997. As Jonathan Schwartz says, we'll have to wait until 1998 for "a DVD Christmas."

DVD Pros and Cons

	Pros	Cons
Capacity	[illegible]	Lack of DVD-ROM [illegible]
Video	Great quality, full-screen interactive MPEG II video at 720 horizontal pixels times 480 vertical lines—the same compression as DSS. On par with LaserDisc, much better than VHS.	[illegible] [illegible]
Sound	[illegible]	[illegible]
Data transfer	Second-gen DVD-ROM drives transfer 2.76MB/s (a 16x CD-ROM drive moves at 2.4MB/s). Enormous boost to multimedia and games	[illegible]
Backward compatibility	[illegible]	[illegible]
Copy protection	Users can't pirate encrypted video or audio from DVD video discs.	[illegible]
[illegible]	[illegible]	[illegible]

> "For the **immediate future**, we're focusing on the **OEM** opportunities where we can **ensure** there's definite **compatibility**."
>
> —*Brad Crystal, Activision*

*But the **Hardware** Is a-Shippin'*

While software vendors are playing wait-and-see, hardware vendors are plunging head-first into the new world. Jeff Moeser, director of desktop and server marketing at Micron, says, "We're shipping so many systems with DVD right now, we've already gotten the ability to drop prices." Moeser says Micron's systems, loaded with Hitachi drives and E4 decoder cards, were tested with many different pieces of software. "Everything that we could possibly throw at our machine runs perfectly. It's designed to run all types of software out there, and we'll stand behind it."

Component manufacturers are going full speed ahead, as well. Rob Duncan, Matsushita senior product engineer for data storage, predicts DVD-ROM drives will overcome CD-ROM drives in the marketplace within two years: "DVD will be the standard on consumer systems and have a large penetration into the commercial market for training and sales pitches, and in laptops for mobile presentations." Duncan, however, doesn't believe DVD-ROM will kill CD-ROM overnight.

Micron's Moeser agrees: "I don't think DVD-ROM is going to replace the CD anytime soon. It's going to be a couple of years. I'm always going to want a cost-effective, cheap CD-ROM drive in a machine; a $40 to $50 drive I can use in entry-level PCs. So maybe the PC in the $1,200 price band doesn't have a DVD—it's got a 16x or 24x CD-ROM, and the machines in the higher price bands have a DVD-ROM drive."

While first-generation DVD-ROM drives couldn't read CD-Rs, nor play CD-ROMs anywhere near as fast as CD-ROM drives, today's second-generation drives perform much better. Hitachi marketing manager Peter Doelling says second-gen drives address big concerns: "There's maybe over a billion CD-Rs out in the market, and often customers don't realize that the CD-ROM they're putting in their machine is really a CD-R," Doelling says. "Most second-generation DVD-ROM drives are backward compatible with CD-R and are usually considered 2x [2.76MB/s] with 20x or 24x CD-ROM speed [3MB/s and 3.6MB/s respectively]."

*When to **Upgrade***

While software developers may still be negotiating obstacles, it's reasonable to think bundled titles will work with whatever system or upgrade kit you buy. If developers observe Intel's informal "bounding" agreement, there could be little or no problem when software that supports Microsoft's DirectSHOW MCI and driver specs starts appearing in late 1998. If you plan on upgrading now, make sure your second-generation drive supports CD-R. There are no guarantees, but it wouldn't be unreasonable for early adopters—you know who you are—to jump in today. It can only help the installed base.

DVD is here, it's real, and it's the future of data storage. b

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Microsoft
Windows 95

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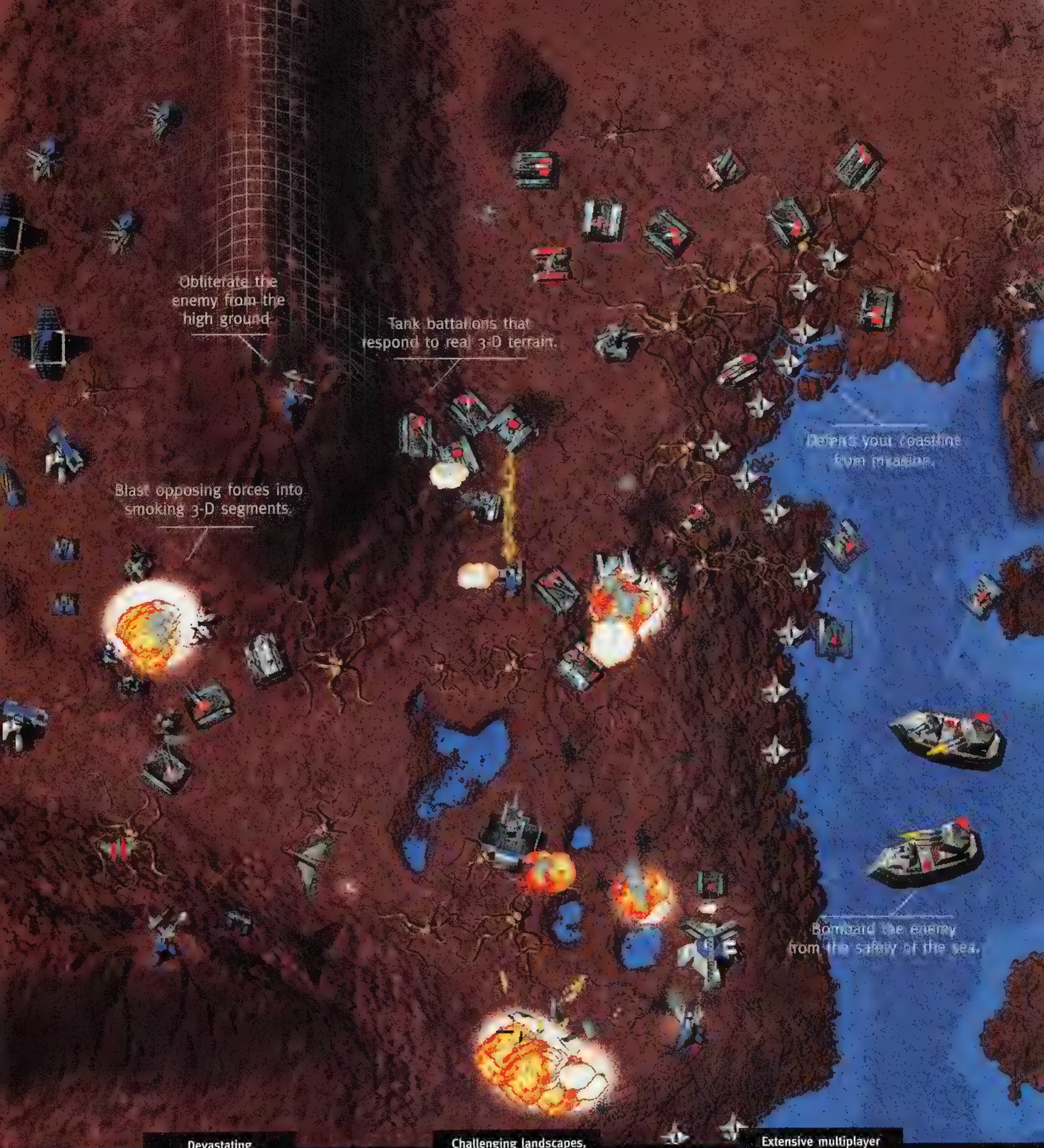
Product Information Number 151

Download new units from www.cavedog.com
Use the 3-D terrain as cover against attack.
50 missions, over 150 units including a full host of land, sea, and air forces.



Obliterate the enemy from the high ground

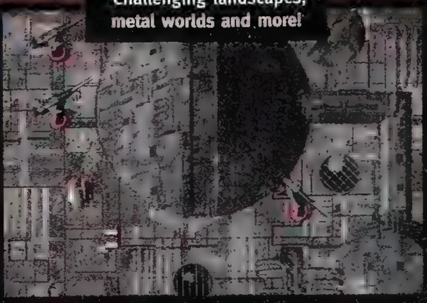
Tank battalions that respond to real 3-D terrain.

Defend your coastline from invasion.

Blast opposing forces into smoking 3-D segments.

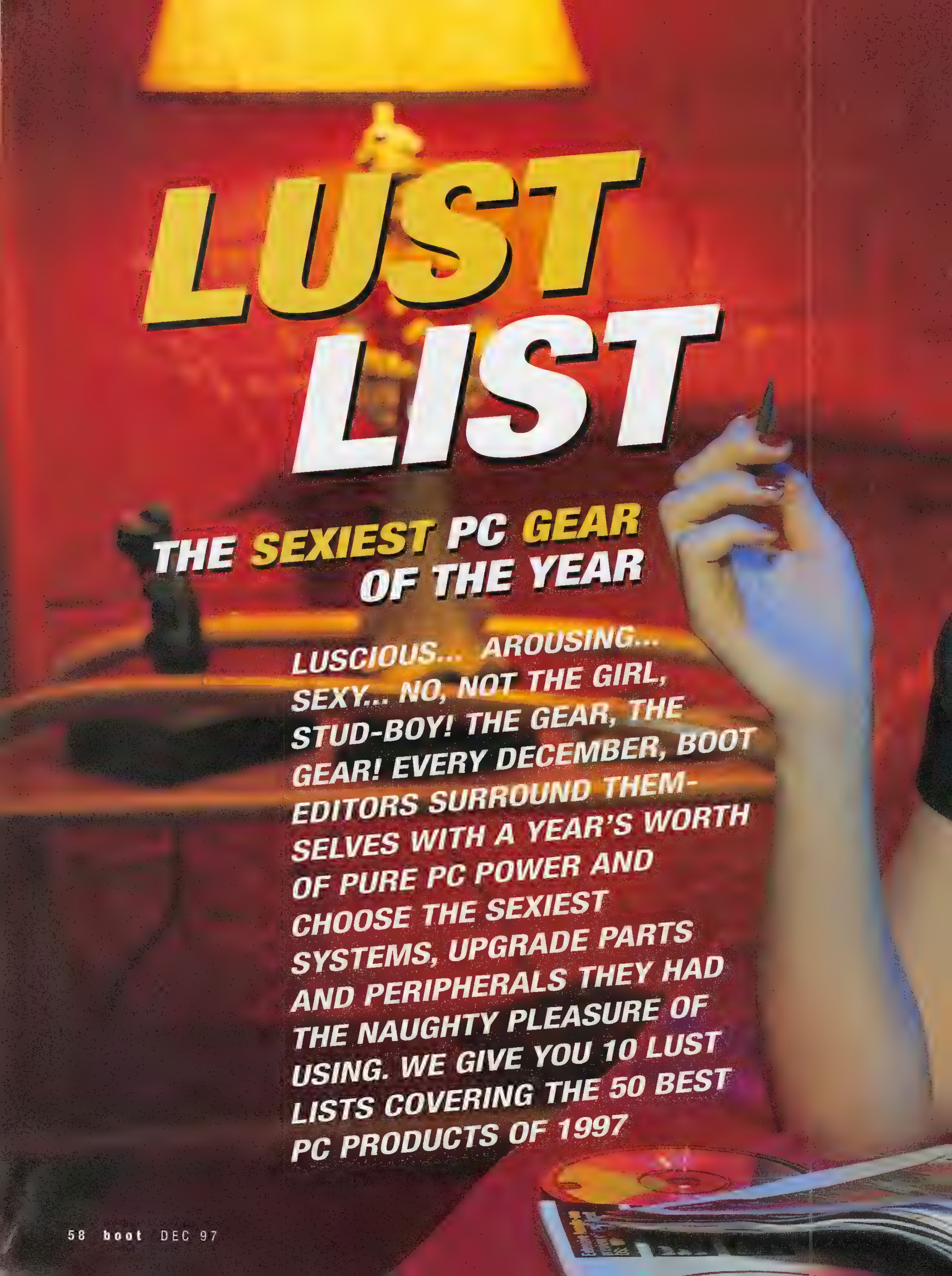
Bombard the enemy from the safety of the sea.

Devastating amphibious assaults.



Challenging landscapes, metal worlds and more!

Extensive multiplayer and internet support.



LUST LIST

THE SEXIEST PC GEAR OF THE YEAR

LUSCIOUS... AROUSING... SEXY... NO, NOT THE GIRL, STUD-BOY! THE GEAR, THE GEAR! EVERY DECEMBER, BOOT EDITORS SURROUND THEMSELVES WITH A YEAR'S WORTH OF PURE PC POWER AND CHOOSE THE SEXIEST SYSTEMS, UPGRADE PARTS AND PERIPHERALS THEY HAD THE NAUGHTY PLEASURE OF USING. WE GIVE YOU 10 LUST LISTS COVERING THE 50 BEST PC PRODUCTS OF 1997

[illegible] PRODUCT SHOTS: AARON LAMB [illegible]

Andrew "Handy Andy" Sanchez, Hardware Editor

Specialties: *motherboards, speakers, hentai.*

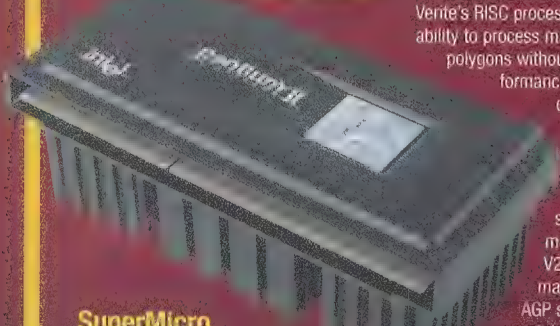
Steeped in pop culture for almost three decades, our workhorse of a hardware editor can link an Ahnuld Schwarzenegger or Roxy Music reference to almost any computer component. Just don't bash his bootMarks unless you got the cojones to go toe-to-toe with the man.

Dual Pentium II 300MHz

Whether you're knee-deep in *Quake II*, or rendering high-res *3D Studio Max 2.0* files, nothing can compare to the glory that is the Pentium II. With a 300MHz core processor speed, 512K of tightly coupled ECC-L2 cache, and active cooling mounted firmly to it, there's nothin' I can't do. Don't give me any fake-ass, FPU-impotent clones—give me the real deal for all my computing desires. And with a dual-boot between NT 4.0 and Win95, I can render away the day or frag some fool, and not worry about whether I'm fast or not—because I am. Who cares if they look like Nintendo cartridges. I'd mount these bad boys in, overclock 'em to 333MHz, and let God sort it out. I'll be body-baggin' until my fiance tells me dinner's ready. WhOOp!

PRICE: *$849*
COMPANY: *Intel*
PHONE: *800.628.8686*
URL: *www.intel.com*

300MHz Pentium II



SuperMicro Super P6DLS Motherboard

So sue me. I have a super-bonzoid AT server tower case at home. AT gives me something never seen before in any ATX design: The ability to have more than five PCI slots. CPU cooling via the supply power? No thanks. I have two 300W redundant power supplies and three power fans blowing through my case—and I can add more if I want. With all this in mind, let me introduce SuperMicro's Super P6DLS MB AT formfactor motherboard. This thing is phat with dual-processor support up to 300MHz. With a total of eight PCI slots, one AGP slot, and Intel's 440LX AGPset, I can get all the texture-storage goodness that it grants. And if I need an add-in 3D accelerator—or two, or three—I can fill those PCI slots and still have room for my Adaptec 2940UW SCSI card, PCI sound card, video capture card, and anything else thrown at it. The three ISA slots can take card of my Roland SCC-1 Sound Canvas, Sound Blaster 16, and another to spare so Jackie Amico doesn't go out of business. Oh, the board also supports UltraDMA/33 and ACPI/PC 98, and comes with USB ports, twin serial and a single parallel port, and IrDA. Throw in the 1GB of maximum EDO RAM, and my case will be swimmin' in dual P-II heaven.

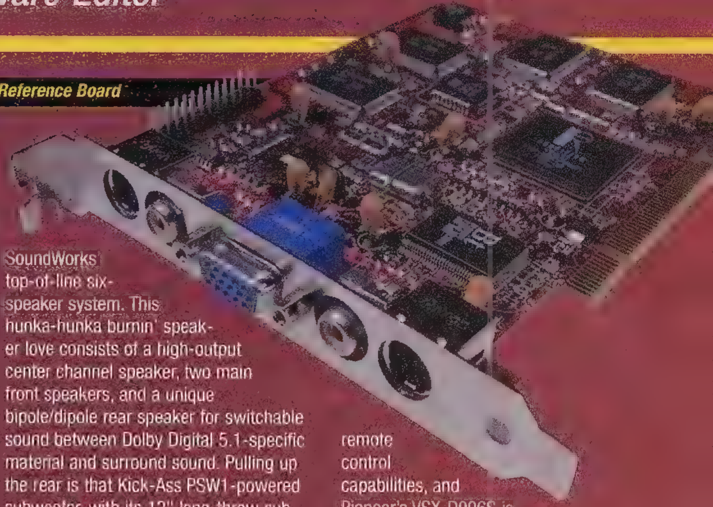
PRICE: *$480 (in lots of 1,000)*
COMPANY: *SuperMicro*
PHONE: *408.895.2000*
URL: *www.supermicro.com*

Hercules Thriller 3D Rendition Verite V2200 AGP

I knew everyone's sporting serious wood over 3Dfx right now, and, indeed, *GLQuake* and all the other 3Dfx-enhanced games make me feel funny below the belt just as much as the next *boot* editor. But I'm a sucker for the underdog, and before there was *GLQuake*, there was Rendition Verite's *Vquake*, which single-handedly showed the world that 3D hardware acceleration kicks the ass of software rendering. Bump the resolution down to 512x384, pile on the anti-aliasing, and you've got one slick version of *Quake*. I like the Verite's RISC processor power, and its ability to process massive amounts of polygons without taking a major performance hit (something 3Dfx can't do). And with the V2200's faster processor, video-in and -out capabilities, and impressive Direct3D performance, I'm lusting for a V2200 part that's matched up with Intel's AGP spec. So, I'm turning my sights on Hercules' Thriller 3D. Sporting 8MB of EDO-DRAM, full composite and S-Video-in and -out, and AGP 1x DMA mode (I know: Execute mode is better—tell Rendition to make it!), D3D games and native Speedy3D/RRedline games will course through my system and give me body!

PRICE: *TBA*
COMPANY: *Hercules*
PHONE: *510.623.6030*
URL: *www.hercules.com*

V2200 Reference Board



Cambridge SoundWorks MovieWorks 5.1 with Slave Subwoofer

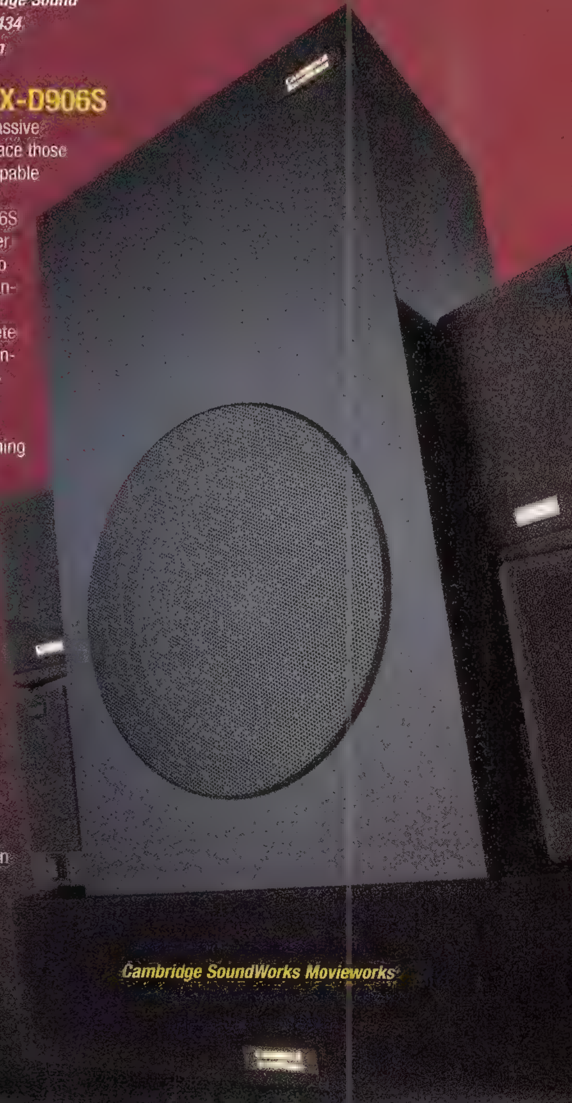
Nothing sez lovin' like Cambridge SoundWorks' top-of-line six-speaker system. This hunka-hunka burnin' speaker love consists of a high-output center channel speaker, two main front speakers, and a unique bipole/dipole rear speaker for switchable sound between Dolby Digital 5.1-specific material and surround sound. Pulling up the rear is that Kick-Ass PSW1-powered subwoofer, with its 12" long-throw subwoofer and dedicated 140W amplifier. But this system only comes with one of these bad boys, and I want earth-shattering, spackle-shaking, neighbor-scaring bass. So, I'd throw Cambridge's Slave Subwoofer into the mix, increase my bass output to 200W, and warn my next-of-kin.

PRICE: *$1,799.99+$299.99*
COMPANY: *Cambridge Sound*
PHONE: *800.367.4434*
URL: *www.hifi.com*

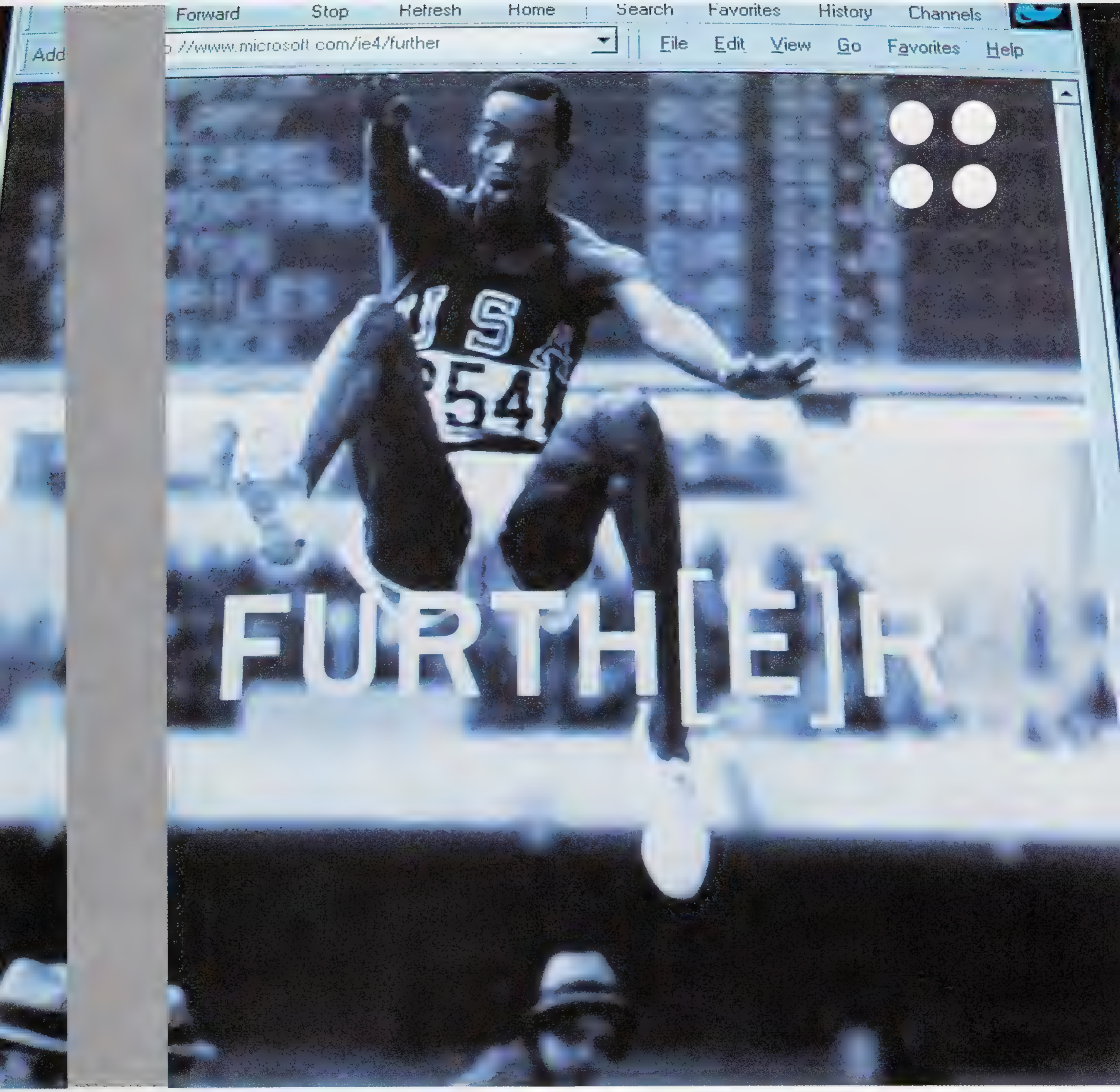
Pioneer VSX-D906S

To power those massive MovieWorks, I'd place those monsters in the capable amplified hands of Pioneer's VSX-D906S audio/video receiver. Pumping 100W into each of its five channels, the amplifier section uses discrete MOSFET output transistors on all channels. Why so much power? 'Cause I expect to hear nothing but aural excitement, not wimpy spastic sound waves that clip due to insufficient amplifier power. With five video and audio inputs, Dolby Pro Logic, and Dolby Digital/AC-3 processing, I can fire up DVD *Batman Forever* and *Jedi Knight*, and test how much shaking my anchor bolts can handle. Throw in an integrated GUI, digital inputs, DSP, and a garage-load of remote control capabilities, and Pioneer's VSX-D906S is what I'm getting hot and bothered about. Plug it in and fire me up, baby!

PRICE: *$1,210*
COMPANY: *Pioneer USA*
PHONE: *800.421.1606*
URL: *www.pioneerelectronics.com*



Cambridge SoundWorks Movieworks


Forward
Stop
Refresh
Home
Search
Favorites
History
Channels
Add
p //www.microsoft com/ie4/further
File
Edit
View
Go
Favorites
Help
USA
254
FURTH[E]R

Brad "Big Daddy" Dosland, Editor-in-Chief

Specialties: *digital cameras, publishing hardware, sailing.*

Ever the instigator, boot*'s editor-in-chief likes pitting the bootBoyz against each other in technology slugfests. The bouts keep* boot *in fighting shape, and ensure the magazine remains in good stead with the World Boxing Association.*

Dream Machine 97

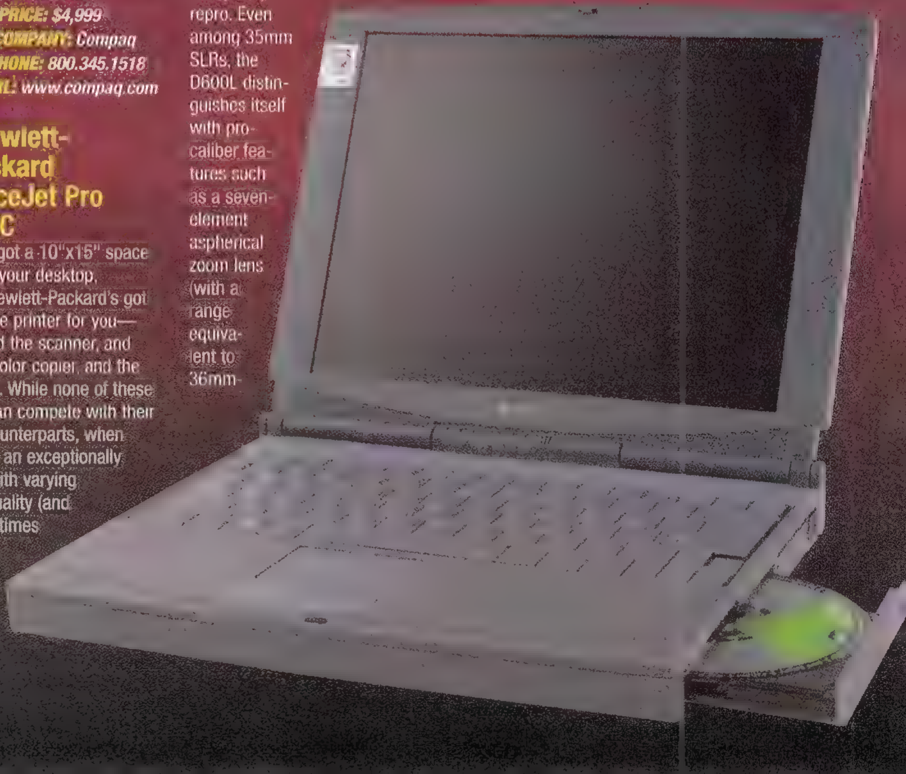
OK, choosing this year's Dream Machine may be cheating a bit. Coming correct with an entire Lust List of awesome components, Dream Machine 97 congeals to form the ultimate PC. Running a 300MHz P-II (overclocked to 333MHz), 64MB of buffered DIMMs, and a BIOS optimized to take advantage of an ISA-free bus, DM97 dusts all PCs that have stepped into the bootLab. Quality components, custom-tailored to hum under the hood, make all the diff: Diamond's 3Dfx-based Monster 3D video card and PCI Monster Sound card, ATI's All-in-Wonder, OptiQuest's 19" V95 monitor, and Altec's ACS48 cold kickin' speaker system. Toss in speed-demon storage in the form of Plextor's 12/20PleX CD-ROM and a Micropolis 4.3GB SCSI Stinger, and you're staring down the barrel of sheer PC domination. (reviewed in *boot* 13, page 48)

PRICE: ***$4,944***
COMPANY: ***boot***
PHONE: ***don't call us—not for sale!***
URL: ***www.bootnet.com***

Sony VAIO notebook

The Dream Machine is tops when you're parked at a desk, but what do you do when you take your show on the road? Well, you need desktop-caliber performance and features combined with a battery life that makes the journey worthwhile. Sony's stylish mobile VAIO manages to shoehorn together a 166MHz mobile Pentium, 32MB of SDRAM (upgradeable to 128MB), a 12.1" active-matrix screen running at 1024x768/16-bit color, a 14x built-in CD-ROM drive (swappable with a standard floppy drive), a 2GB hard drive, an integrated 33.6 modem, NTSC video in/out ports—who needs Playstation when you can play *Hexen II* on the big screen?—and even USB support. All of this in a box that's well under two inches tall and weighs in at just over 5lbs. Toss in the optional $600 docking station, and this Miata of a notebook will consistently out-maneuver even the most nimble of desktop beaters. (reviewed in *boot* 15, page 84)

PRICE: ***$4,499***
COMPANY: ***Sony***
PHONE: ***888.476.6972***
URL: ***www.sony.com***

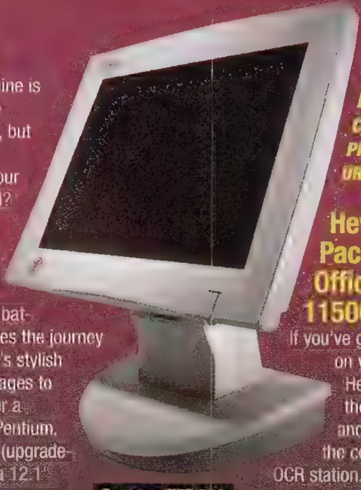


Sony VAIO Notebook

Compaq TFT500 flat panel

Long the domain of Vaporville, the glory that is flat-panel monitors came of age this year. Some were pathetic (CTX' PanoView), and some were just disappointing (ViewSonic's BP140). But the Compaq TFT500 made the dream a reality. Imagine a 15.1" active-matrix monitor running at 1024x768 in 16 million colors at refresh rates of 75Hz. Sound boring? Well then, wrap this in a package that's a mere skitch over three inches thick. The TFT500's modest base includes a USB hub with three ports for all your next-gen controllers and peripherals. If your desktop real estate can't muster even this sacrifice, an optional arm mount is available to take the display skyward. The TFT500 is bright and beautiful, and off-axis viewing is the best we've seen in a TFT screen. All in all, the TFT500 hangs with any like-sized CRT, and then fires the afterburners with its jaw-dropping size. (reviewed in *boot* 14, page 86)

PRICE: ***$4,999***
COMPANY: ***Compaq***
PHONE: ***800.345.1518***
URL: ***www.compaq.com***



Compaq TFT 500

Hewlett-Packard OfficeJet Pro 1150C

If you've got a 10"x15" space on your desktop, Hewlett-Packard's got the printer for you—and the scanner, and the color copier, and the OCR station. While none of these components can compete with their stand-alone counterparts, when combined they form an exceptionally efficient package. With varying degrees of image quality (and corresponding print times ranging all the way down to 7ppm), the 1150C can spit out very impressive color output, whether it's a file from *Photoshop* or a color copy from the unit's flatbed scanner. Images print at 600dpi, and the laser-sharp text is über-legible. Hooking up this bad boy is a snap: One plug into your parallel port in ECP mode, and you're in business. Plus, with the included *PictureLink* software, most 32-bit-compliant apps sprout new menu items for acquiring OCR text or graphics. No more side trips to an image-editing app or dedicated OCR program. All for one and one for all.

PRICE: ***$1,000***
COMPANY: ***Hewlett-Packard***
PHONE: ***800.333.1917***
URL: ***www.hp.com***

HP Office Jet Pro 1150C

Olympus D600L

Previous consumer-caliber digital cameras have been the equivalent of film-based point-and-shoot cameras. The D600L from Olympus represents the genre's leap to SLR performance and features. In a world full of 640x480 resolutions, the D600L is livin' large with images up to 1280x1024. Spit one of these images down the high-speed parallel connector to an optional Olympus P-300 printer, and at 3"x5" I dare you to discern the difference between digital and silver-halide-based snapshots. The progressive scan CCD captures images in a single pass, eliminating any possible ghosting that may occur with moving images captured in separate RGB passes. And the 1.4 Mega Pixel resolution is ready for print repro. Even among 35mm SLRs, the D600L distinguishes itself with pro-caliber features such as a seven-element aspherical zoom lens (with a range equivalent to 36mm-110mm). The macro setting focuses down to 11.8 inches. The D600L's lens is all-glass with true multi-coating for pure, accurate colors. The TTL viewfinder allows ambitious shutterbugs to compensate for back-lit conditions and even spot meter for perfect exposures every time. The built-in flash has modes to compensate for back-lit and low-light situations, plus a fill-flash mode and, of course, the ever-annoying red-eye reduction flicker. Toss in the features that distinguish digital cameras—LCD preview panel, direct download into your PC via TWAIN, SmartMedia cards with removable storage capacities up to 8MB—and you've got the digital camera I want come 1998.

PRICE: ***$1,200***
COMPANY: ***Olympus***
PHONE: ***800.347.4027***
URL: ***www.olympus.com***

TM

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www.microsoft.com/ie/

Where do you want to go today?

Internet Explorer 4

Microsoft

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Jon "Philly" Phillips, Executive Editor

Specialties:
Internet, monitors, organized crime.

Our nervy-dervy executive editor likes his coffee black and his feature stories packed with plenty of charts and pretty drawings. But nothing piques his interest like a hot craps table, or the sight of a Buick Grand National escaping into the night.

HP Pavilion 8190

Lusting? You bet I'm lusting—lusting to settle a long-standing vendetta against Hewlett-Packard. Before I became fully indoctrinated to the bootWay, I bought an HP Pavilion 7360, a P200 MMX machine that was the best my local computer store could muster. It took me only an hour to discover that the 7360 actually *defied* upgrading: Its had only two open PCI slots, and its proprietary LPX mo'board couldn't be swapped out. Worse yet, I couldn't upgrade the onboard ViRGE with my ATI All-in-Wonder without automatic system crashes. But vendettas don't last forever. Today, HP gets extra bonus points for not only building a great machine, but for actually adjusting its corporate mission to respect and serve the power user. The 8190 is upgrade-friendly and stoked with stamina. We're talking a 300MHz P-II, a standard ATX motherboard with four PCI slots, and ATI's 3D Rage Pro. This 3D card is the only 2x incarnation of AGP currently shipping, and it's in a slot, not onboard, so I can swap out at will. State-of-the art power for this price? Splendid. (reviewed this issue, page 130)

PRICE: *$2,999*
COMPANY: *Hewlett-Packard*
PHONE: *208.323.4663*
URL: *www.hp.com*

TeleVideo SVP350

My monitor needs are simple but strict: I need an aperture grille tube for its superior color brilliance. I need 21 inches because I'm spoiled. And I need good onscreen controls for inevitable fine-tuning. The SVP350 fulfils each requirement, and is practically devoid of the niggling performance glitches that only become apparent when you put a CRT through the most trying tests. Even better, the SVP350's color saturation is uniform from top to bottom (when working with high-res files that fill the entire diagonal, nothing is more heartbreaking than uneven color saturation). The 0.28mm grille pitch tube displays 1600x1200 at 85Hz. Pull me from the showroom, baby, I'm sold. (reviewed *boot* 14, page 96)

PalmPilot Professional

PRICE: *$1,649*
COMPANY: *TeleVideo*
PHONE: *800.835.3228*
URL: *www.televideo.com*

Matrox Millenium II

You wanna hear heartbreaking? Heartbreaking is unpacking your new 21" monitor only to discover your existing video card can't handle the requisite resolutions, color depths and refresh rates. So now you need a top-end 2D card—like the no-nonsense Millenium II. Matrox owns 2D performance with this bad-ass 8MB display engine. First off, the 250MHz RAMDAC draws your screen superfast to maintain super-high refresh rates at superhigh resolutions. Second, the dual-ported WRAM gives you incredible speed performance by allowing both the RAMDAC and MGA-2164W graphics chip to simultaneously access memory. Third, Matrox just plain makes good drivers. This booming card gives you 1900x1200 at 16-bit color and 1920x1080 at 24-bit color (perfect for the new breed of 24" monitors), and can be upgraded to 16MB. Bring it on!

Matrox Millenium II

PRICE: *$299*
COMPANY: *Matrox*
PHONE: *800.844.8302*
URL: *www.matrox.com*

PalmPilot Professional

The PalmPilot Professional is more than merely functional, it's positively indispensable—or so say the people who have one. During the past year, seven out of 10 *boot* staffers purchased this kick-ass PDA. Does that tell you anything? It all starts with the midget size (it'll fit in your breast pocket), Graffiti (the best handwriting recognition software ever created), and the endless supply of third-party apps (there's even a version of Tamagocchi). I asked for a Pilot in last year's Lust List, but Santy didn't oblige. Maybe he's storing his "good children" list on a Sharp Zaurus. Ouch! (reviewed *boot* 8, page 85)

PRICE: *$369*
COMPANY: *3Com*
PHONE: *800.881.7256*
URL: *www.palmpilot.com*

Diamond Audio HPM-4100 Speakers

If the downstairs neighbors are gonna play bad classic rock during the A.L. playoffs, then I'm gonna corner-load the HPM-4100's audacious subwoofer directly over their living room, and blast some Busta Rhymes, Strong Island-style. This uncompromising speaker package attacks both audio CDs and *Quake* canon blasts with major ill will—might have something to do with the 100W power amp. The two satellites handle the most stinging mids and highs without straining. The 8" paper-cone subwoofer sits in a scary-looking dual-vented enclosure, dropping down to an arrogant 35Hz before rolling off. Your neighbors can sit anywhere they like—but not for long.

PRICE: *$600*
COMPANY: *Diamond Audio*
PHONE: *310.582.1121*
URL: *www.diamondaudio.com*

Diamond Audio HPM-4100 Speakers

Kevin "Flash" Ashburn, art director

Specialties:
printers, Quark, BBQ

With an insouciant grace found in only the finest single-barrel bourbons (and double-barrel shotguns), our dry-witted art director is always good for a ripping good time. Now if we can only pull him off your girlfriend at the 4th of July mixer.

Sony GDM-W900 24" Monitor

Ask most Americans what they want and you'll get some flavor of the standard reply: More. For this Yank, it's more monitor. Way more. The Sony GDM-W900 ponies up an additional three inches of viewable area (22.5") on its 24" wide, 16:10 aspect screen, leaving those in the 21-and-under crowd feeling just plain cramped.

For page jockeys like me, that means more room for palette-hungry apps like *Quark* and *Photoshop*, and good bye to the little games of click-and-hide that keep me one step from the pistol. The true test: The GDM-W900 easily accommodates a two-page *Quark* spread at full size with plenty o' palette space in the margin. Plus, it also offers the beauty of multiple-app screen-viewing to kick productivity into hyperdrive. Did I mention its footprint is about the size of a dainty 21"? Good boy.

Sony's new pony offers lush images of up to 1920x1200 in 24-bit color, and both "normal" and "expert" on-screen adjustments, allowing users to fine tune themselves into a living hell. Flash says buy one today, and bring the drive-in home.

Company: *Sony*
Price: *$4,995*
URL: *www.sony.com*
Phone: *800.352.7669*

Sony GDM-W900

Iomega Zip Drive

Fellow bootBoys silently scoff at the mention of poor Zippy, admittedly a relative eunuch among its lustier counterparts. But he's here to anchor the practical, and what I'm after is large file transport and a big installed base. Since mid '95 you can't swing a dead Syquest without clocking a Zip owner in his smiling face. Everywhere I go, there Zippy is, ready to give and receive my high-res scans, multiple layouts and other esteemed participants of the high megabyte party.

The Zip's 29ms average seek time coupled with small, sturdy and inexpensive media make this love affair far from over. I love you Zippy, and I don't care who knows it.

Company: *Iomega*
Price: *$149*
URL: *www.iomega.com*
Phone: *800.771.1000*

Epson Color Stylus 3000 Printer

Not long ago, getting pro-quality color pages from your digital files meant a trip to the local Stinkos or your de facto service bureau. The cost of bringing that quality home was simply prohibitive. Enter the Epson Stylus 3000.

At a mere $449, the Stylus 3000 offers 1440x720dpi photo-quality output on paper sizes from 4"x4" up to 17"x22". That means full-bleed spread comps that come damn close to digital

Sean "Sean Downey" Downey, Software Editor

Specialties: *CDR, Windows, backpacking.*

Being software editor on a magazine devoted to hardware is like being a vegetarian at a steak ranch. Pass the A1? No thank you!

Rolodex REX Deluxe

I'll admit it: I'm horribly disorganized and absent-minded. I have a Dayrunner with scribbled-in appointments sitting on the floor of my car, and a Rolodex stuffed full of business cards on my desk. Nary the two shall meet. Don't tell me I need a PDA. I don't need something that complex, and I'm not about to carry around a little gizmo that makes me look like I just beamed down from the Enterprise. I need something that's there when I need it, and slips into my pocket when I don't. Enter the REX. It's no larger than a credit card and weighs less than two ounces, yet stores up to 2,500 entries and runs for as long as six months on two lithium ion batteries. Powered by TrueSync technology, it's designed to slip into a Type II PC card slot for quick and painless data synchronization. It also synchs with an optional docking station that connects through your serial port. It just may be the only thing that can possibly organize my sorry life.

Yamaha CDRW 4001

Price: $179
Company: Rolodex Electronics
Phone: 888.739.6400
URL: www.franklin.com/rex

Canopus Pure3D

You can whine all you want about other chipsets with more advanced designs, but when it comes down to it, 3Dfx has all the software. If you want your latest games to have velvety smooth acceleration and framerates that'll give you retinal flashburns, you need a 3Dfx card. Considering the overwhelming support for the Voodoo chipset, there really isn't any alternative. Parallel processing is the secret to the Voodoo's texture-mapping magic. Two separate memory systems are used: Traditionally, 2MB for textures and 2MB for the frame buffer. The difference between the Pure3D and other 3Dfx cards is the 4MB of texture memory it packs. This gives it extra oomph to render highly detailed scenes. With the Pure3D's TV-out capabilities, I can extend the life of my hand-built P200 MMX system at home by jacking it into my TV, and tossing my PlayStation out the door. (reviewed this month, page 114)

Rolodex REX

Price: $179
Company: Canopus
Phone: 800.649.9800
URL: www.canopus.com

Seagate Cheetah 4.3GB UW Hard Drive

My hard drive needs are simple. I don't need gigs and gigs of space because I don't keep a lot of software loaded. If it's crap, I delete it nearly as fast as it was installed. I just need to have instantaneous access to whatever's on my hard drive at any given time. I also need something that can keep up with the occasional CD-R burn and video capture. The Cheetah is currently the fasted hard drive on the planet. It features a blistering fast spindle speed of 10,000 RPM and a 512K cache (optional 2MB is $100). The 7MB/s sustained data transfer rate and 17MB/s burst throughput keeps data constantly at your fingertips, and sucks down freakishly large (608x456) video clips at 30fps. The Cheetah is the premiere drive for your platter-rattling throughput needs. Nothing else comes close. (reviewed next issue)

Price: $775
Company: Seagate
Phone: 800.732.4283
URL: www.seagate.com

Yamaha CDRW4001

Imagine a 6xRead/4xWrite/2xRewritable drive that's everything the CDR400 was and more. It's rigged with a 2MB buffer and writes in the seven major CD dialects (CD-ROM, CD-DA, CD-ROM/XA, CD-i, CD-Extra, and Video CD). Yamaha has improved upon its Kick-Ass award-winning drive by making it rewritable, but the coolest thing about Yamaha's new CD-RW drive is that it does its writing and erasing with random access ease. The combination of the software and hardware puts the power of random access at your CD burning fingertips. Thanks to Adaptec's DirectCD 2.0, you can now erase separate files instead of having to wipe clean the entire CD.

Seagate Cheetah

Price: $549
Company: Yamaha
Phone: 800.543.7457
URL: www.yamahayst.com

Sony PCV-240

The PCV-240 is built around a 300MHz Pentium II with 64MB SDRAM plugged into a 440LX AGP motherboard. Featured components include a 6.4GB hard drive, a 24x CD-ROM drive, and an IDE zip drive. Video editing software and a TV tuner with stereo television reception complement the amazingly versatile ATI All-In-Wonder Pro AGP card. But the strength of the PCV-240 lies in the details. Composite and S-Video input and output jacks all line up in the rear of the system, but the coolest things are the input jacks that are easily accessible from the front. This is the type of thing that makes Sony's VAIO desktop system a detail freak's delight.

Price: $ 3,300
Company: Sony
Phone: 800.635.7669
URL: www.ita.sel.sony.com

pre-press color proofing. Who needs the Rainbow at about a buck a page?

Epson uses its Micro Piezo ink jet technology and Quick-Dry CMYK inks to crank to out its pretty pages at a max rate of seven color pages per minute, and comes standard with Adobe Postscript level 2 and PANTONE-calibrated approved colors. An Ethernet upgrade awaits the network-inclined. As an added bonus, you get a little cross-app QC: The Stylus 3000's driver interface allows you to fine-tune output settings and then save them to specific apps. Add up the pluses, kids: This bad boy could bring wood from Gutenberg's mummy.

Company: Epson
Price: $449
URL: www.epson.com
Phone: 800.463.7766

The Umax PowerLook 2000 Scanner

Normally another millennium reference would have scared me off from the get-go. But if the PowerLook 2000 is indeed a peek at the future, pop the champagne.

This 36-bit scanner offers a whopping hardware resolution of 1000x2000dpi and a software interpolation as high as 10000x10000, giving it unbelievable detail especially in the hard-to-reach shadow areas that often escape its pretender competitors. The ability to scan directly into CMYK mode for press production saves lost color range during conversions from RGB, and the PowerLook is one of the few scanners I've seen whose transparency adapter produces crisp output from 35mm and 120mm film. The PowerLook is also quick on the draw. Its 3MB I/O buffer via a SCSI II interface routinely kicks out 4"x 5" 1000 dpi scans in under a minute. When they stuck "Power" in the title, Umax kept its promise.

Canon Optura

Company: Umax
Price: $5,500
URL: www.umax.com
Phone: 800.562.0311

The Canon Optura Digital Camera

You gotta love a camera that does triple duty. As the digital camcorder "that performs like a 35mm SLR camera," the Canon Optura allows you to record video in three different recording modes: Normal Movie Mode for TV or NTSC playback; Progressive Scan Movie, employing a controllable shutter speed for up to 30fps; and "photo mode" for 35mm-style photography. In photo mode, the Optura performs like most any SLR camera. While recording digital stills, you can adjust the shutter drive and aperture, and attach an EOS flash to control lighting. It sports a 14X optical/35X digital zoom lens and Optical Image Stabilization. As a camcorder, the Optura uses miniDV format cassettes, records either 12- or 16-bit digital audio, and offers image transition effects. Pick up the Optura, and feel your wrist waving goodbye to film.

Company: Canon
Price: $2,499
URL: www.canon.com
Phone: 800.OK.CANON

Sean "Clevey" Cleveland, *disc editor*

Specialties: *SCSI, hard drives, pulp horror.*

Fame, fortune, fast cars—none of it means dink to our cerebral disc editor. Give the man a meaty white paper on I/O technology, and he'll forget his name, his age, and where he left his coveted copy of House of Secrets #92.

Gateway 2000 Destination D6-300

Sure, I could get an AGP system now, but I would be kicking myself when the 440BX chipset arrives. Thank you, but I'll wait for 4x AGP and a 100Mhz system bus. I wouldn't mind playing *Dungeon Keeper* from my couch, though, or even watching DVD movies on a thumping sound system.

Well, the Gateway 2000 Destination offers all that. I would, of course, want one with all of the options: a 300MHz Pentium II, 256MB RAM, the incredible 31" monitor, the wireless keyboard and mouse, the optional 4MB Apocalypse 3Dx 3D accelerator, the 8.4GB Ultra ATA hard drive, and the full Harmon/Kardon High-Fidelity Surround sound system. Other options I would take include the 3Com 10/100 Ethernet card, Iomega Zip drive, Epson PhotoPC 500 digital camera, an EasyPhoto Drive, and MS Sidewinder Pro Joystick. (reviewed *boot* 14, page 58)

BASE PRICE: *$6,983*
FULLY LOADED: *$8,464*
COMPANY: *Gateway 2000*
PHONE: *800.846.2000*
URL: *www.gw2k.com*

Diamond Fireport 40 Dual UW SCSI Host Adapter

When 3Dfx introduced its Voodoo chipset, it cost me a PCI slot—the one being used by my second SCSI card. Dual-channel SCSI cards are nothing new, but they've traditionally required two precious IRQs—until now. The Fireport 40 Dual essentially incorporates two Fireport 40 SCSI cards into one. Both channels are driven by a single integrated Symbios Logic 53C876 RISC script controller that provides two Ultra Wide SCSI interfaces. The result is a lower-priced dual channel host adapter that presents a single load on the PCI bus, and, more importantly, uses one IRQ. The second channel can also be used to separate slower drives, such as CD-ROM drives, from your faster Wide hard drives. Bring it on!

PRICE: *$299*
COMPANY: *Diamond*
PHONE: *800.468.5846*
URL: *www.diamondmm.com*

Plextor PlexWriter

Micropolis Tomahawk UW SCSI Hard Drive

Being the Disc Editor, I have a tendency to fill up hard drives. When I heard about the forthcoming 20GB Tomahawk, I instantly knew what I wanted for Christmas. Not only is it large, it's also fast. This Ultra Wide drive has a spindle speed of 7200 rpms, offers a maximum data rate of 10MB/s, uses 2MB of onboard cache for buffering, and comes in a small 3.5-inch form factor. Another big plus is that it comes from the AV line of Micropolis products, making it well-suited for multimedia and storage-intensive audio and video applications. These AV products are guaranteed not to drop frames, delivering a smooth stream of data that can be relied upon when doing production work. If I don't get this drive, the Ultra2 LVD version coming out soon will more than make up for the wait.

PRICE: *$2,245*
DEVELOPER: *Micropolis*
PHONE: *800.395.3748*
URL: *www.micropolis.com*

20GB Tomahawk

EIZO FlexScan FX-E8 21" Monitor

Nothing bugs me more than monitors that can't handle high resolutions. That's why I did a double-take when I saw the recommended resolution of the EIZO FX-E8: 1600x1200 at a maximum refresh rate of 87Hz. I was skeptical. When it arrived, I promptly jacked it into an 8MB Number Nine Revolution 3D AGP video card, and pumped it up to 1600x1200. Not only was the picture sharp, it handled the max refresh rate of the video card—81Hz—without a problem. The FX-E8's Invar Shadow Mask CRT has a dot pitch of .26mm. You also get a great anti-reflective, anti-static coating, and an unusually high horizontal scanning range of 30-110kHz—all packed into a low-profile case. The coolest feature is the One Touch Auto Adjustment, which automatically adjusts the picture and size of the screen; handy when resolutions change in games. While the price may seem a bit steep, I'm a firm believer in "you get what you pay for." EIZO monitors are worth every penny.

PRICE: *$2,667*
DEVELOPER: *EIZO*
PHONE: *800.800.5202*
URL: *www.eizo.com*

Eizo Flexscan 21"

Plextor PlexWriter 4/12max SCSI CD-R Drive

Imagine a CD-R drive that writes at a maximum speed of 4x and reads at a maximum of 12x. Enter the Plextor PlexWriter 4/12. Its memory contains specs on all major CD-R media, allowing it to adjust both its laser power and burn time to maximize reliable writes. Gone will be the days of Buffer Under-Runs and the inability of older CD-ROM drives to read media cut by high-speed CD-R drives. Paired up with the new 14/32 UltraPlex CD-ROM drive that supports UltraSCSI burst rates, the PlexWriter is such a happy thought, well, it just brings tears to my eyes.

PRICE: *$529 Internal/$619 External*
COMPANY: *Plextor*
PHONE: *800.753.9867*
URL: *www.plextor.com*

Daevid "Vampire" Vincent, *webgoth*

Specialties: *CGI, sound cards, goth/industrial.*

When our spooky-kooky webmaster works his PERLy magic, the whole bootNet comes alive. So drop by the site and spy on him. Who knows, he just might spy back with the Color Quickcam we inserted into his left eye socket.

PARIS Audio Recording Integrated System

PARIS is the ultimate computer sound recording system: a control console, interface box, PCI sound card and software. This package gives you unlimited virtual tracks divided among 128 real tracks, all streaming from 16 independent outputs while simultaneously recording on 16 ins. And all this is processed by eight real-time simultaneous effects in true 24-bit 48khz digital audio. Processing power oozes out the wazoo, thanks to six ESP-2 VLSI chips humming away at 26MIPS each. Did I mention real sliders and knobs for traditional tactile control, and a 4U I/O rack-mount cage? Now that's the sticky stuff musician's wet dreams are made of! Yes, this PCI-based MIDI/Direct to Disk Digital Audio Workstation recording system has everything a pro studio needs. Sick!

PRICE: *$3,300*
COMPANY: *Ensoniq*
PHONE: *617.647.3930*
URL: *www.paris.ensoniq.com*

Digital 8-BUS Mixing Console

Mixing boards *are* computers: Imagine a fully digital 20-bit 128x oversampling A/D and D/A board that remembers your every movement—every slider push and knob twist. A mixing board so powerful, it has its own 1.2GB hard drive, 8MB RAM, mouse, keyboard, monitor and 33.6Kbps modem ports. This bastard can even pump your email on its 40x2 fluorescent display. Motorized flying faders create a whole new universe of possibilities and control. That is, a fader doesn't have to control only gain or attenuation: It can manipulate panning or reverb decay time, or whatever parameter you'd like. Everything and anything on this board can be tweaked, stored and then recalled instantly either in real-time or as a snapshot.

PRICE: *$10,000*
COMPANY: *Mackie*
PHONE: *800.898.3211*
URL: *www.mackie.com/Products/D8B.html*

PARIS Recording Studio

Ricochet Wireless Modem

I want mobility. I want unteathered freedom. I want unlimited access, 24/7, with no hidden charges and no busy signals. I want what I *didn't* get from last year's

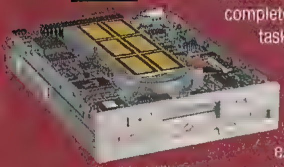
Bryan "Chief Bagogo" Del Rizzo, *news editor*

Specialties: notebooks, game controllers, baking.

Our jet-setting news editor won the rights to his nickname when he picked the winning bird in a Port-au-Prince cock fight. When he's not investigating bootWire stories and conducting Lip interviews, the Canadian national likes reciting lore from his homeland.

a:drive

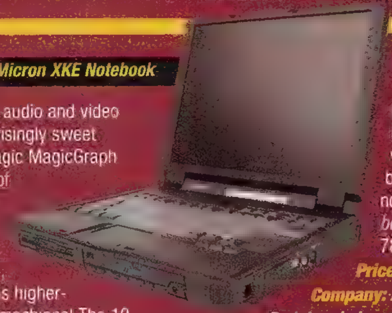
Imagine a new type of floppy drive that can host up to 120MB of data, and is even backward-compatible with existing 1.44MB diskettes. Now imagine that this drive can be used as a bootable device. Now imagine that this drive delivers exceptional performance, almost five times as fast as a traditional floppy drive. Well, guess what? The a:drive offers all of these features for a little under $200, and compared to other removable storage devices, it's fast—damn fast. Formatting a disk on a regular floppy drive took almost two minutes, while the a:drive completed the same task in only 15 seconds. Copying a 1MB file took exactly one minute on a regular floppy, but the a:drive needed only nine seconds. So why isn't the a:drive (or SuperDisk as the technology is now known) widely accepted? Beats me. I wanted the a:drive in our Dream Machine, but sadly, it was outvoted by our Zip contingent. I say ditch the Zip and make the switch. (reviewed *boot* 05, page 109)



a:drive

***Price:* $195, $15/cartridge**
***Company:* O.R. Technology**
***Phone:* 408.866.3000**
***URL:* www.ortechnology.com**

Micron XKE Notebook



Micron XKE Notebook

I reviewed close to 100 products in the past 12 months, and the XKE is the only item that earned my coveted 10 rating. The 166MHz MMX processor is speedy enough on its own, but coupled with superior audio and video subsystems (surprisingly sweet wavetable; NeoMagic MagicGraph 128XD with 2MB of video memory), the XKE's performance is literally off the charts. Hell, it even outperforms higher-powered desktop machines! The 10-cell 5400mil battery is a godsend, producing three hours of continuous use. Other XKE goodies include a USB port, 48MB of EDO DRAM, a built-in modem, and a to-die-for port replicator. Mighty tasty. (reviewed *boot* 14, page 84)

***Price:* $5,399 ($499 for port replicator)**
***Company:* Micron**
***Phone:* 800.209.9686**
***URL:* www.micronpc.com**

Avatar Shark 250

If you're looking for an effective alternative—and a much more mobile-friendly solution—to the Zip drive, cast your net, and haul in this awesome Great White. Since the Shark 250 plugs directly into your parallel port, installation is painless, making the unit a suitable companion for any notebook. Performance and reliability is great, and the fish is plenty rugged. We dropped one from a height of 40 inches with nary an ill effect. The Shark 250 weighs less than half a pound, requires only a smidgen of desk space, and is perfect to take on the road. The 250MB HARDiskette comes with its own protective jacket made of an elastomeric rubber compound. Even better, the media is dirt cheap: A three-pack of HARDiskettes will cost you but a single C-note. (reviewed *boot* 09, page 78)

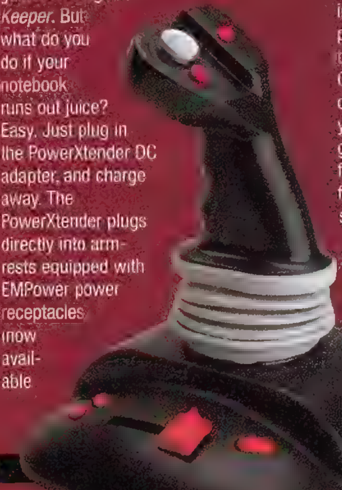
***Price:* $299.99**
***Company:* Avatar Peripherals Inc.**
***Phone:* 888.462.8282**
***URL:* www.goavatar.com**

Xtend PowerXtender Notebook Adapter

Plane trips are boring. Travel enough, and you'll quickly learn the only sane way to pass the time is to immerse yourself in a game of *Dungeon Keeper*. But what do you do if your notebook runs out juice? Easy. Just plug in the PowerXtender DC adapter, and charge away. The PowerXtender plugs directly into armrests equipped with EMPower power receptacles (now available on most major airlines), or into any car cigarette lighter. Both 50W and 30W versions are available. Weighing only 11 ounces, why wouldn't you want one?

***Price:* $99**
***Company:* Xtend Micro Products**
***Phone:* 800.232.9836**
***URL:* www.xmpi.com**

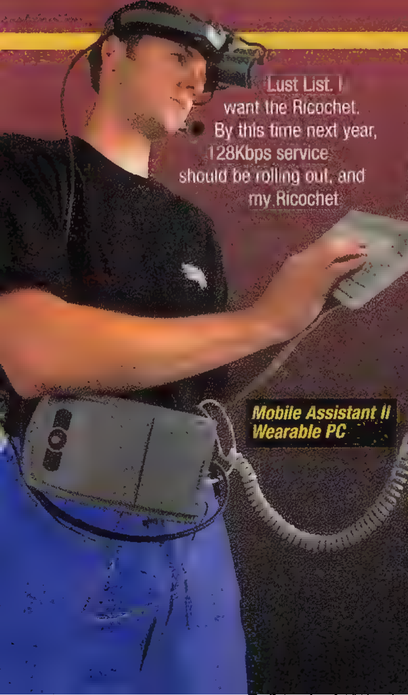
Millennium 3D Inceptor



Millennium 3D Inceptor

Ripped right from the cockpit of the Space Shuttle, the Millennium incorporates a unique pitch-over and twist hand grip design that is based on NASA's Rotational Hand Controller. Since the Millenium's grip pivots around the center of your hand as you move, the end result is a singular gaming sensation. The Millennium also features a high-speed digital interface, a four-way hat-switch, five fire buttons, a sliding throttle control, and a trigger. It's wickedly programmable, and comes with an easy-to-use Win95 interface. Skip Space Camp, and try out the Millennium instead.

***Price:* $80**
***Company:* Thrustmaster**
***Phone:* 503.615.3200**
***URL:* www.thrustmaster.com**



Mobile Assistant II Wearable PC

Lust List. I want the Ricochet. By this time next year, 128Kbps service should be rolling out, and my Ricochet modem will be compatible, while all you sniveling little copper-land-line lovers will still be trying to get your K56flex and X2 modems to communicate with each other. The little Ricochet modem attaches directly to notebooks. Just as long as you're within range of a transceiver (they sit atop telephone polls), you'll get reliable throughput wherever you're parked. (reviewed *boot* 04, page 84)

***PRICE:* $350, $30.00/monthly service**
***COMPANY:* Ricochet**
***PHONE:* 408.399.8200**
***URL:* www.ricochet.net**

Mobile Assistant II Wearable PC

PalmPilot? Got one. Notebook? Too big to carry. But a wearable PC for completely hands-free computer operation? Now your talking more my style! This P133 with 32MB RAM, 1.4GB hard drive, and two Type-II slots—all in a miniscule 9"x2"x5" shell weighing less than 3lbs—will crush your wimpy alternatives. Add to that a Head Mounted Display (HMD) and voice recognition, and whoa! Anyone got a tissue? I just made a mess.

***PRICE:* $9,000**
***COMPANY:* xybernaut**
***PHONE:* 703.631.6925**
***URL:* www.xybernaut.com**

TD-225

I've been a diehard Linux user since the early 1.0.8 kernel. There isn't anything like being able to log into a machine and truly multitask without fear of crashing because the crappy OS can't handle the task switching. Having Java built directly into the OS ain't so bad either. Oh, and X-windows? Now that's the GUI that God intended us to use. So what better way to give something back to my little penguin buddy than a screaming fast 266MHz Pentium II, an enormous 128MB of EDO RAM, and a blazingly fast 9GB Ultra-Wide SCSI HD with up to 40MB/s transfer rates and 8ms access time? Oh, and how about two 21" 1600x1200 monitors for a multi-headed display—because I can with Linux, and you can't with Win95. This system will eat up NT boxes for lunch, and have a SGI 02 hors d'oeuvre using Windows95 to clean its teeth. Grrr.

***PRICE:* $7,400**
***COMPANY:* Intergraph**
***PHONE:* 800.692.8069**
***URL:* www.intergraph.com**

Chris "The Dunphinator" Dunphy, Technical Editor

Specialties: 3D chipsets, alternative OSes, aviation

Our perpetually optimistic technical editor is always willing to crawl out on a limb in support of unproven technologies—and that's what makes him so damn fun in a bootLab fire fight. Poke his stomach, and he'll giggle up something controversial.

Optiquest V95 Monitor

The V95—a potent part of Dream Machine 97—is the ultimate balance of cost, features, and screen size. Its case consumes only slightly more desk space than a typical 17 incher and weighs only 48lbs, but the 19" shadow mask CRT inside stirs up 21" emotions. The 0.26mm pitch picture quality is superb, and the tube can handle 1280x1024 at 86Hz and 1600x1200 at 76Hz—amazing resolutions typically seen only on "pro" models. All the usual tweaks are adjustable from simple on-screen menus, and the V95 is fully versed in DDC Plug-n-Play. The 19" CRT is the natural progression from the now-familiar 17 incher, and the V95 is the most finely polished 19 incher I've seen. Though the $895 price might seem steep, remember that your monitor will likely outlast your next PC, so why not bust loose now for a display you'll surely want later? I'm crossing my fingers and toes—buddha-style—hoping to find this box under my tree. (reviewed *boot* 13, page 100)

Price: $895
Company: Optiquest/ViewSonic
Phone: 800.843.6784
URL: www.optiquest.com

Micron Millennia XRU with Fusion 3D

Micron knows how to build PCs the *boot* way: Piece together the latest technology until you've got a box that can do it all without compromises. The Millennia XRU is so impressive, we had to bust ass to build a Dream Machine that would outperform it. And even then, Micron's ultimate system offers DVD and a lower price than we mustered. The biggest problem with the XRU is that it's just too full. With a Stealth 3D 2000 Pro, Monster 3D, E4 CoolDVD MPEG-2/AC-3 Decoder, Sportster 56.6Kbps modem, and SoundBlaster AWE64 filling the slots, there's only a single slot left for future expansion. The 266MHz Pentium II smokes, the DVD drive outperforms all but the best CD-ROMs, the 64MB DIMM hungers for data, and the Cambridge SoundWorks MicroWorks speakers have the power to blow you away. The next best thing to building it yourself. (reviewed *boot* 13, page 78)

Price: $4,439
Company: Micron
Phone: 800.209.9686
URL: www.micronpc.com

Sejin FreeBoard Beamer

I never thought I'd give up a dependable wired keyboard for an infrared device. IR may be nice for an occasional game of *You Don't Know Jack* from the couch, but even an occasional dropped character is unacceptable for hardcore writing. But ever since I brought the Sejin FreeBoard Beamer home, my old wired model has been gathering dust in the closet. This keyboard just refuses to give any ground to my IR prejudices. I'm now totally spoiled by simply grabbing the Beamer, typing from my lap while reclined, surfing from the couch, and stashing it out of the way when I'm done. Thanks to three IR transmitters around the perimeter of the sexy black case, it requires serious effort to find an angle at which characters are dropped. The trackball mouse glides effortlessly under my thumb, and the whole keyboard has a great feel and tactile response. (reviewed *boot* 12, page 111)

Price: $139
Company: Sejin
Phone: 888.373.3273
URL: www.sejin.com

Optiqest V95 Monitor

ATI All-In-Wonder Pro, Canopus Pure3D, Matrox m3D

I want the best of everything when it comes to graphics controllers, so it's little wonder that it takes three cards to satisfy me. Providing the foundation for my trifecta will be the supreme do-it-all, the ATI All-In-Wonder Pro. This puppy packs video in, video out, and the coolest TV tuner anywhere into one slot. Of course I'll want it loaded with 8MB of SGRAM, and living on the AGP bus. Though ATI is no longer a 3D slouch, nothing can touch the sheer number of titles written for 3Dfx. The 6MB Canopus Pure3D (reviewed this issue, page 114) delivers Voodoo delights galore, as well as TV-out. With these features and twice the texture memory of other Voodoo cards, this board is currently the high priest of the Voodoo cult. And of course I can't be without my *Ultim@te Race* fix. The 4MB Matrox m3D (reviewed this issue, page 108) delivers sweet PowerVR goodness to my eyes, and will let me play *Quake* at 1024x768. Together, these three boards deliver 18MB of pure graphics power that can't be beat.

All-In-Wonder Pro
Price: $299 (4MB)
Company: ATI
Phone: 905.882.2600
URL: www.atitech.com

Canopus Pure3D
Price: $179
Company: Canopus
Phone: 408.954.4500
URL: www.canopuscorp.com

Matrox m3D
Price: $99
Company: Matrox
Phone: 800.844.8302
URL: www.matrox.com/

Canopus Pure 3D

Door-to-Door
CO-PILOT
TRAVROUTE

TravRoute Co-Pilot

TravRoute Door-to-Door CoPilot

When the first CD-ROM-based mapping programs came out—the ones that cram every American street onto a single disc—I was transfixed by the omniscient power of being able to zoom from a global view down to my own city block. Then came software that could tell you how to get from anywhere to anywhere, as well as software that could sync to a Global Positioning System, and track your travel progress with a moving dot on the computer screen. But until the TravRoute Door-to-Door CoPilot, no program could both track where you are and give you directions to where you're going. What's more, the CoPilot can be controlled with voice commands, letting you keep your hands on the wheel. And if you ever make a wrong turn, the software will notify you, and instantly recalculate your route to get you back on track. The package comes bundled with a small GPS and all the software you need to navigate the entire continental US down to the neighborhood street level—on one CD.

Price: $399
Company: TravRoute
Phone: 888.872.8768
URL: www.travroute.com

Sherry "Like the Wine" Monarko, associate art director

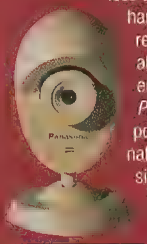
Specialties: scanners, Photoshop, rhythm and farkles.

Cruising in on her mountain bike every morning at promptly 11:13 a.m., our associate art director sits down, surrounds herself with Mountain Dew cans, and pops out pages faster than any boot editor can write. Catch her if you can!

Panasonic EggCam

What sits on top of my monitor, looks like a cyclops, and allows me to visit friends across the country for less than the cost of a plane ticket? It's the EggCam, the little cam that can. From atop its easy tilt-and-swivel base, the EggCam captures 32-bit still images at 640x480, and 30fps full-motion video at 320x240. A built-in omnidirectional microphone can simultaneously record audio. Automatic gain control adjusts lighting exposure on the fly, and the focus can adjust to capture my nose from four inches away or from across the room and beyond. Besides the egg, you also get a ton of condiments: cables, a miroVidCon PCI video-capture board, VideoLink Mail software to compress audio/video for email attachments, White Pine's CU-SeeMe for real-time videoconferencing, and Microsoft's Vidcap 32. Say hello to the golden egg.

Price: $200
Company: Panasonic
Phone: 800.742.8086
URL: www.panasonic.com



Panasonic EggCam

Minolta Dimage V

My personal newsletters take longer and longer to publish, due in large part to the time it takes to shoot, develop, scan, and tweak photos. If I can skip the middlemen with the Dimage V, I'll at least finish the online version sooner, and at resolutions up to 640x480. Macro focusing is also possible for the little things in life. The camera's 2.7x zoom lens is rotatable, detachable, and perfect for taking sneaky photos around corners without subjects knowing they're being shot. When detached, the lens is connected by a 3'3" cable to the body, where the color LCD finder lives. I can use this 1.8" monitor for single-image deletion, or switch to nine-up index mode to see where I've been. Up to 32 high- or 80 low-res JPEG images are recorded to compact 4MB memory cards, so I can auto-flash away all day. All said, this camera offers all the must-have features, plus an exceptionally versatile lens.

Price: $620
Company: Minolta
Phone: 714.898.4593
URL: www.minoltausa.com

Iomega Jaz Drive

Iomega Jaz

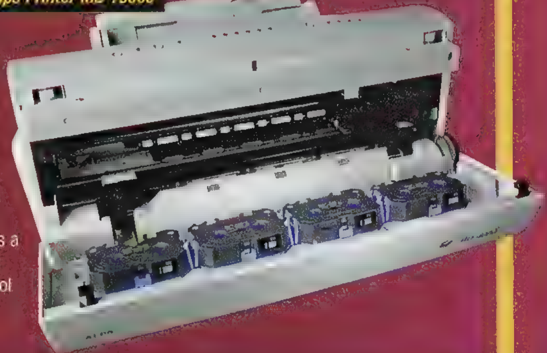
To hold every digital file I've ever produced, every demo and video I've ever downloaded, every email letter from every far-away friend, and the four versions of the idea that didn't pan out but might next time, I need a bigger, better removable storage drive. The 1GB Jaz drive offers just the right amount of endless space, using optimized Winchester hard drive technology and a 256K read/write cache. These features, along with a SCSI option, make it fast enough to use as a scratch disk for *Photoshop* in a pinch. For greater portability, it also comes in an external parallel version. The biggest decision is whether I want an internal version, so I don't have to look at another peripheral, or the external, so I can just plug it in. Either way, Jaz rocks.

Price: external $399, internal $299, media $89
Company: Iomega
Phone: 801.778.1000
URL: www.iomega.com

Alps MD-40000 Color Printer/Scanner

My home "office" is really a corner, so fitting several quality peripherals into it is tricky. Enter the MD-4000 do-it-all color printer/scanner. The MD-4000's printer conjures color at 600x600dpi (1200x600 in black and white). Unlike its inkjet buddies, it uses dry ink that resists smearing, and produces excellent blacks. The printer can handle nearly any media I might try to jam into it—plain paper, transparencies, iron-on transfers, whatever. Inks are also available in cool metallic colors. Remove paper, adjust feeder, attach special holder, and viola! The MD-4000 is now a scanner. The scanner can pump 24-bit TWAIN-complaint pics right into *Photoshop* in a single pass, delivering optical resolutions up to 600dpi. Alps' CopyStudio software allows preview, crop, and other adjustments of the scan before commitment. For its last trick, the MD-4000 can scan, then spit the page back out, essentially becoming a color copier. The file is then immediately deleted from the hard drive. Spacious! (reviewed *boot* 5, page 111)

Price: $699
Company: Alps Electric
Phone: 800.825.2577
URL: www.alpsusa.com



Alps Printer MD 10000

Sony Vision Touch CAV-2

A high-tech clutter buster, the VisionTouch will rid my apartment of remote control infestation. The sleek charcoal interface box is the ultimate in RC, as it controls ultimately, well, everything! VisionTouch acts as a programmable IR conduit between all remote control devices—the television, the VCR, the CD player—and anything that can be controlled via IR signals, which can include many appliances and even lights! The system comes pre-coded for many brand-name devices right out of the box, and can learn additional codes from existing remotes. Attach your computer to the CAV-10 interface box via modem cable, load the software, and VisionTouch is ready to rock. Software upgrades are available online. From your computer-cum-central control unit, software allows you to program any and all devices to receive IR-emitted commands, and macros can execute a sequence of commands to multiple devices in a single stroke. This stuff is strictly Jetsons. (reviewed *boot* 7, page 86)

Price: $199.95
Company: Sony
Phone: 800.222.7669
URL: www.sony.com

TRY THE LUST-O-MATIC

Rating
Lust-O-Matic

Need help finding the right gear for your needs and money? Go straight to the bootDisc, and fire up the Lust-o-Matic. This one-stop shoppin' buddy sorts through Lust List '97, and shoots you just the swag that'll make your tongue wag.

TRY IT ON THE DISC

If you're ever about to buy a specific type of component, you must visit the bootNet at www.bootnet.com. Every product review we've ever written can be found in our bitchin' database. Sort by product name, company, component category, bootVerdict rating, and date of review. You'll never buy a bum part again.

"Kick ASS"
(Gasp! Well..I never!)

The editors of *boot* magazine never did, either.

Never saw a desktop that even came close to the Micron™ Millennia® XRU with Fusion 3D,™ or a notebook that topped the TransPort® XKE, that is.

That's why *boot* gave both systems an ass-kicking 10 out of 10. There's no better way to describe them.

For desktop kicks, the Millennia's rabid speed, performance and power will blow you away, thanks to our raging Fusion 3D option with DVD, 2D and 3D video cards, and a speaker system that'll hurl your boots back to the cow they came from. And when you buy a Millennia with Fusion 3D, you'll also get our wild-eyed multimedia gaming bundle and you'll pick one of four software bundles.

The editors of *boot* called the TransPort XKE portable "the créme-de-la-créme of notebooks," and they said the Millennia XRU with Fusion 3D is the closest thing to their dream machine you can buy. Strong language? We deserve every word.

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MMX™ intel inside pentium® PROCESSOR

MICRON MILLENNIA MME

Intel 233MHz Pentium processor with MMX™ technology
64MB SDRAM
6.4GB Ultra ATA hard drive
24X EIDE variable speed CD-ROM drive
17" Micron 700FGx, .26dp (16" display)

STANDARD FEATURES

512KB pipeline burst cache, flash BIOS
Integrated 100MB Iomega Zip drive, 3.5" floppy drive
32 voice wavetable stereo sound with speakers
USR Sportster 56K x2 data/fax modem'
PCI 64-bit 3D video, MPEG, 4MB EDO DRAM
Microsoft® IntelliMouse,™ USB Connections
Microsoft Windows® 95 and MS® Plus!
Microsoft Office 97 Small Business Edition
Choice of Micron Software Solutions Pak
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MICRON MILLENNIA XKU

Intel 266MHz Pentium II processor (features MMX technology)
64MB SDRAM
6.4GB Ultra ATA hard drive
24X EIDE variable speed CD-ROM drive
17" Micron 700FGx, .26dp (16" display)

STANDARD FEATURES

82440LX chipset
512KB internal L2 cache, 2MB BIOS
Integrated 100MB Iomega Zip drive, 3.5" floppy drive
32 voice wavetable stereo sound, Advent 009 speakers with subwoofer
USR Sportster 56K x2 data/fax modem'
Diamond Viper V330 128-bit 3D video with 4MB SGRAM
Microsoft IntelliMouse, USB connections
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
Choice of Micron Software Solutions Pak
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FUSION 3D OPTION PAK

DVD-ROM,'' DVD software
E4 Cool DVD PCI decoder card: 6 channel AC-3 to 2 channel out capability, SPDIF output (digital audio out)
AWE 64 ISA sound card
Cambridge SoundWorks/MicroWorks- 2 speaker satellite with subwoofer stereo system
Monster 3D graphics card with 4MB memory'''
Fusion 3D game pak: Mech Warrior 2: Mercenaries D3D version, AH-64D Longbow, U.S. Navy Fighters '97, Command & Conquer, Formula 1 D3D version
MS Sidewinder Pro joystick

ADD $699

FUSION 3D OPTION PAK

DVD-ROM,'' DVD software
E4 Cool DVD PCI decoder card: 6 channel AC-3 to 2 channel out capability, SPDIF output (digital audio out)
AWE 64 ISA sound card
Cambridge SoundWorks/MicroWorks- 2 speaker satellite with subwoofer stereo system
Fusion 3D game pak: Mech Warrior 2: Mercenaries, AH-64D Longbow, U.S. Navy Fighters '97, Command & Conquer, Formula 1 D3D version
MS Sidewinder Pro joystick

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boot PRODUCT
Millennia XRU September 1997

boot PRODUCT
Transport XKE October 1997

Designed for Microsoft® Windows® 95

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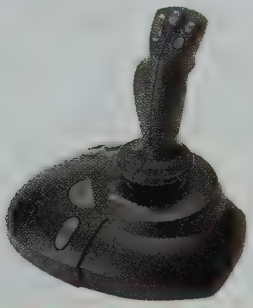


GAMES

EACH MONTH, **BOOT** EDITORS GATHER THE **BEST** PRODUCTS IN A SPECIFIC **CATEGORY** AND DEEM THEM: **BOOTWORTHY**

Do boot editors just ***tweak*** *their systems ad infinitum to raise those precious bootMarks ever higher, or do they actually* ***use*** *their systems? Truth is, while we live to* ***tinker*** *for the sheer* ***pleasure*** *of tinkering, we do often pack up our tool kits, close our cases, and fire up our machines for a few* ***bumps*** *down the boulevard. Drop by the bootLab after hours and you'll find us playing our* ***favorite*** *games.*

A bootWorthy game is defined by category-creating originality, cutting-edge AI, precise simulation detail, endless repeat value, spectacular sound, and well-programmed code that pushes hardware to the ***limits*** *of kick-ass technology. This month, each boot editor picks a bootWorthy title—and we* ***ain't*** *talking* Myst, *if you know what we mean.*

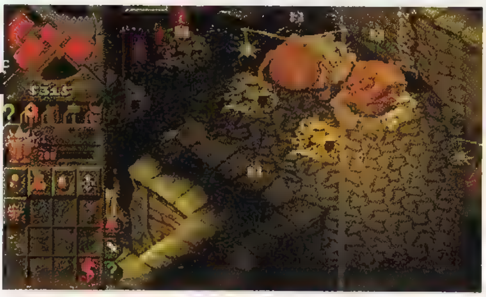
Dungeon Keeper

TRY IT ON THE DISC

Andrew and I almost came to blows over who would claim *Dungeon Keeper* for this list. But when I challenged him to face me head-on in the Dungeon, he backed away, sore from too many late-night thrashings by my legions of Dark Mistresses, no doubt.

Dungeon Keeper balances rich visuals with deep gameplay better than any other game I've come across this year. Combining micro-management, real-time combat, and God-simulation, you design Danté-esque catacombs and kill all the imps who try to raid your cellar. I keep finding myself drawn in for one more go—and every time I play, I discover a little something new. The game's attention to detail is intense. Mind you, you won't have any time to pay attention to detail once the shit hits the fan and combat begins. Once you change gears from dungeon-building to all-out war, your adrenaline does not subside. Battle is fast and furious, whether you manage your minions from an overhead view, or lead them into battle in the first-person. If you tire of killing the computer, up to three friends can join you for even fiercer head-to-head action.

My Christmas wish is for a *Dungeon Keeper* Direct3D patch. Once 3D-accelerated, this game will be just about perfect. —*Chris Dunphy*



YOUR MINIONS ARE VANDALIZING YOUR DUNGEON. BEAT THEM ABOUT THE EARS!

product info

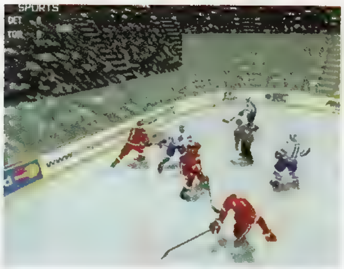
Price $50
Developer Bullfrog
Publisher Electronic Arts
Phone 800.425.4525
URL www.bullfrog.co.uk

NHL 98

The NHL can now disband. No longer do slashing Russian wingmen need suffer rib-cracking body checks against the glass. No Canucks need trade split lips middle ice. The Great One can rest his weary back. *NHL 98* is here, and I'm a happy man. With this year's model, EA Sports has taken sports sims to a new level. Under the hood, a new game engine delivers zamboni-smooth action. And running under 3Dfx, the 16-bit graphics are near photorealistic, with the faces of more than 500 actual NHL players plastered on polygon players. And new player animations are deceptively realistic with new Motion Blending technology.

I really don't care about the game's amazingly fluid play-by-play calling or 26 authentic arenas when I've got my Gravis GamePad Pro, and I'm taking the biscuit to the basket. Still, *NHL 98* has 'em, along with Dolby Surround support that'll let you hear Eric Lindros tearing up the ice behind you—just before delivering that punishing blow. What I *really* care about is a realistic and challenging game, and *NHL 98* delivers. With details such as pin-point passing and powerplay strategies, this game puts you on the ice. Tons of season modes, stat tracking, and multiplayer options round out the package to make *NHL 98* the best sports sim ever. So quit begging for ESPN2. *NHL 98* is here. —*Brad Dosland*

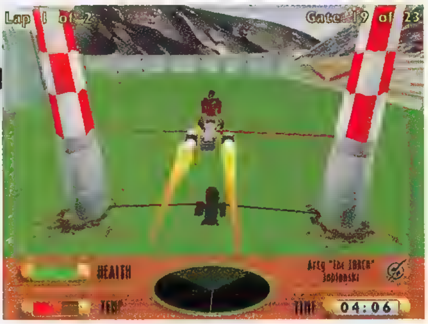
DOSLAND DECLARES NHL 98 THE BEST SIM EVER: "IT'S AN AMAZING GAME"



product info

Price $50
Developer/
Publisher Electronic Arts
Phone 800.425.4525
URL www.easports.com

Rocket *Jockey*



GRAPPLING IS ITS BUSINESS AND BUSINESS IS GOOD. VERY GOOD.

Since its release almost a year ago, *Rocket Jockey* is one of the few select games I haven't erased from my hard drive. And in a year that was filled with big-name bombs—such as just about everything from LucasArts, except for maybe *Jedi Knight*—*Rocket Jockey* was one of 1997's most refreshingly original and exciting racing experiences. Plus, it's just downright fun to play.

The premise is simple: Straddle your jet-fueled steed and fire the engines to compete in three events—Rocket Race, Rocket Ball and Rocket War. Kick butt, and your name shows up on the leader board. Anything less and you'll lose face... literally.

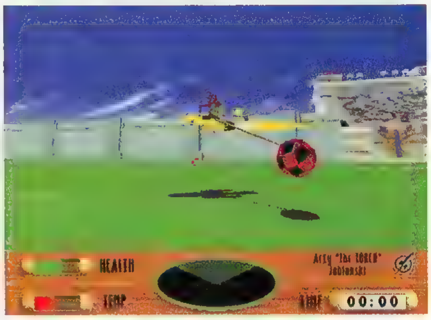
The action is fast and furious, with your 500-polygon rocket-bike pulling a minimum of 20fps. Each of the rockets are equipped with grappling hooks that can be used to hurl you or your opponent around the arena. More sadistically, you can snag your opponents off their bikes, and tow them behind you in the dirt as you race around the track. Better yet, you can slam 'em into the wall for a face full of brick and cement. Cool stuff.

Network support was strangely missing when the game was first released, but SegaSoft atoned for its sins by releasing a patch with support for network play, force-feedback joysticks, and 3Dfx acceleration.

Forget *Pod, Need For Speed II,* and *Carmageddon. Rocket Jockey* rules, as does the very cool Dick Dale soundtrack. And it's only ten bucks. Wow! *—Bryan Del Rizzo*

product info

Price $10
Developer/ Publisher SegaSoft
Phone 888.734.2763
URL www.segasoft.com



Pro Pinball: *Timeshock!*

FROM RENDERED TCHOTCHKES TO ELABORATE DOT-MATRIX ANIMATION, ARCADE ACTION IS BROUGHT TO YOUR DESKTOP.

A pinball game? A pinball game in the same processor-whacking, 3D accelerator-smacking round-up as *Quake, MDK,* and *NHL 98*? You betcha. *Timeshock!* is a state-of-the-art pin sim that makes all other computer pinball games look like community college programming projects. The perfection starts with the table itself: It's a meticulously rendered bitmap, and looks absolutely dazzling at its 1600x1200/24-bit color maximum detail setting. Can any other game claim this res and bit depth?

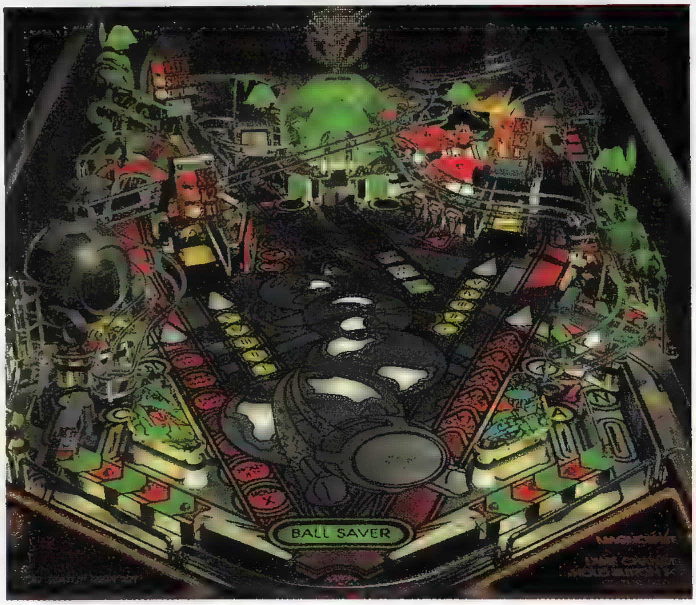
Even better, the table boasts all the ramps, orbits, habitrails, targets and dot-matrix animation you've come to expect from today's most sophisticated solid-state arcade units. *Timeshock!* recreates the real-life experience in every respect, from the kitschy moving mechanical parts and sampled sound effects to the complex rules that require you to complete specific "time travel" missions in proper sequence. In fact, if you've got a 21" monitor, the game is more satisfying than arcade action: It consumes your entire field of view, you don't need an endless supply of quarters, and gameplay physics are dead-on accurate. You can even exercise your "operator's rights" to view the table's full statistical history (to see, for example, how many balls drained through the left outlane), and to tweak "factory presets" (such as the frequency of how often you're awarded extra games). A sometimes-rockin, sometimes-ethereal soundtrack composed by members of The Jam and Stiff Little Fingers complements the entire experience.

Timeshock! will dash the opinions of anyone who thinks a pin sim must be low-tech by definition. The high graphic detail will test your 2D power like no other game. Hell, an 8MB card is requisite for fluid ball movement during the six-ball multiball mode. So now you know why I picked the Millenium II in this year's Lust List. Yes, I'm *that* addicted to this game. Pop the plunger, Elroy!

—Jon Phillips

product info

Price $39.95
Developer/ Publisher Empire
Phone 800.216.9706
URL www.empire-us.com



Diablo

WHAT CAN IT DO FOR YA? SLEEPLESS NIGHTS AND PLENTY OF THEM.

I revel at the thought of delving into a dark, wet dungeon with the odds against me—the exact feeling I get when playing *Diablo*. This dungeon creation and exploration game is a three-quarter isometric sprite-based adventure that ultimately takes you to the bowels of hell to face the Demon Lord. Although the town aboveground stays the same, the dungeon levels change, as they're randomly generated along with numerous quests.

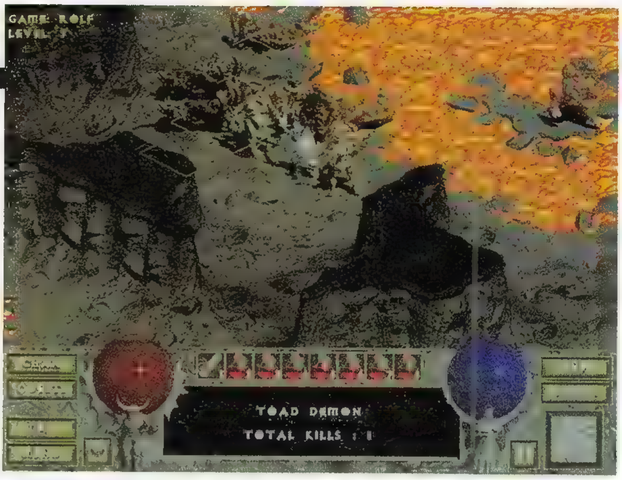
Items and artifacts are cleverly presented, becoming increasingly interesting in the higher levels—and more expensive, too. And while I originally opposed the automatic incremental character saving, I'm grateful for it now. It adds a mortality touch that other games lack: Your character is essentially defined by the items you've got, and acquiring gold isn't easy. This puts a real value on characters that you just don't find in other games.

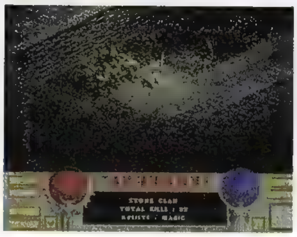
While *Diablo* might seem a bit dated now, the new *Hellfire* expansion pack from Sierra will breathe life back into it, at least until *Diablo 2* arrives. The *Hellfire* pack promises the addition of another character, the monk. With new monsters, items, and levels, I know what I'll be doing over the holiday vacation. Dedicated Battle.net *Diablo* servers for multiplayer adventuring over the Internet round out one of the most satisfying gaming experiences of 1997.

—*Sean Cleveland*

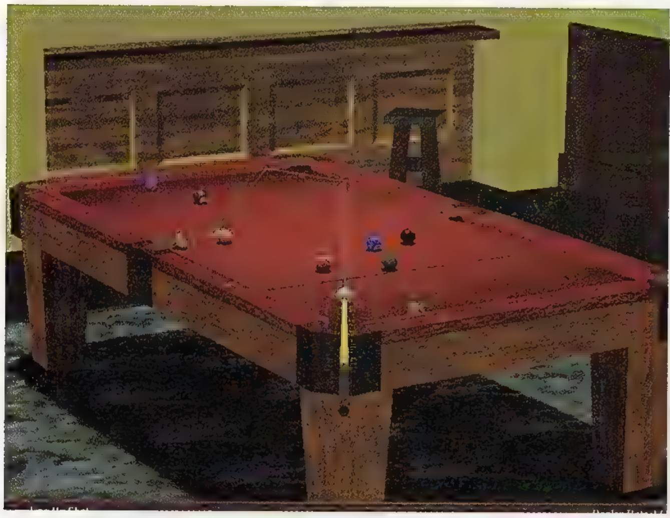
product info

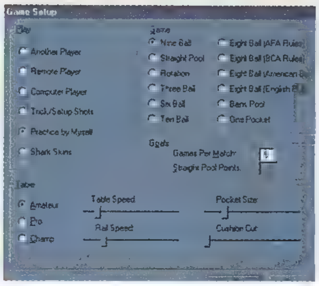
Price $50
Developer/ Publisher Blizzard
Phone 800.953.7669
URL www.blizzard.com


GAME: ROLF
TOAD DEMON
TOTAL KILLS : 1


STONE CLAN
RESISTS : MAGIC

BLOOD KNIGHT




Game Setup
Play
○ Another Player
○ Remote Player
○ Computer Player
○ Trick/Setup Shots
● Practice by Myself
○ Shark Skins
Game
● Nine Ball
○ Straight Pool
○ Rotation
○ Three Ball
○ Six Ball
○ Ten Ball
○ Eight Ball (AFA Rules)
○ Eight Ball (BCA Rules)
○ Eight Ball (American
○ Eight Ball (English
○ Bank Pool
○ One Pocket
Goals
Games Per Match
Straight Pool Points
Table
● Amateur
○ Pro
○ Champ
Table Speed
Rail Speed
Pocket Size
Cushion Cut

Virtual **Pool 2**

ACCURATE PHYSICS AND ENDLESS FREE GAMES HELP YOU REFINE YOUR SKILLS FOR MAJOR SHARKIN'.

Billiards is my all-time favorite sport. It's a game that everyone can play regardless of age, height, weight and gender. I don't always have the time to pack up my pool cue and travel to the nearest billiards hall, but I can easily fire up a CD-ROM and play a game for practice, or against an AI or human opponent.

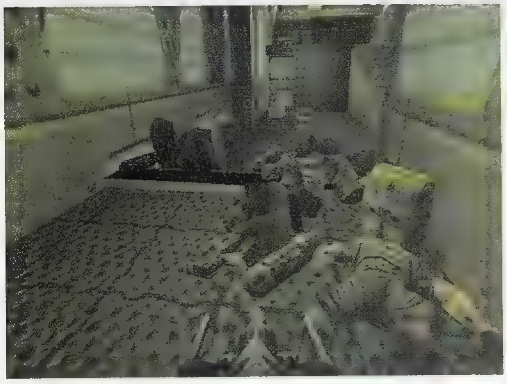
The *Virtual Pool* series offers the best stick sim around. The physics of this game have gone through a two-year overhaul, and most anything I could want to do is implemented in *Virtual Pool 2*. This is a great tool for practicing risky banks you wouldn't dare try in public competition—it will definitely improve your real-life game. Trajectory lines help to visualize angles and line up shots. Various backgrounds complement beautifully rendered ray-traced balls to provide an illusion so real, the only thing missing is your bottle of brew and all the bar brawls.

The sim is also stocked with customization. Table properties include table speed, rail speed, pocket size and cushion cut. You get 12 different games, including four different rules sets for 8-Ball. Modem, Internet and LAN play is available, and a chat window helps sustain all that distracting chatter when you're trying to keep an edge against sharks. *boot* readers will dig the toggle for Pentium-Pro/Pentium-II optimization, and everyone will dig the full statistical recaps.

— *Daevid Vincent*

product info

Price $40
Developer VR Sports
Publisher Interplay
Phone 800.468.3775
URL www.interplay.com



GLQuake v.95

with ***Scourge of Armagon*** and ***Dissolution of Eternity*** mission packs

IT ONLY GETS BETTER WITH ANTI-ALIASING, BILINEAR-FILTERING, AND BLAZING FAST FRAMERATES.

Sure, it was released over a year ago, but *Quake* will still beat you into bloodlust. Nothing stains your BVDs like a couple of grenade-lobbin' ogres dropping from a catwalk and swinging their nasty chainsaws at you. And with 3Dfx providing 28+fps of 3D acceleration and heaps of special effects, you can easily overlook the half-baked plot and mixed-up level designs. Is it medieval, gothic, industrial, or what? Mr. Carmack, are you listening?

The original *Quake* is great, but with the *Scourge of Armagon* and *Dissolution of Eternity* add-ons, you're really ready to light some fires. Throw in cool new technical innovations (rotating brushes, destructible terrain, seismic events) and even more weapons (my favorite being the multi-grenade launcher for clearing out rooms), and it's time to party.

Multiplayer *Quake* is just as intense, with players from around the world clashing on an Internet battlefield. Here at Imagine Publishing, you can fire up *Quake* after 6pm, peek around the server, and someone will have a quickie up-and-running. And thanks to the countless total conversions (TCs), patches, and utilities programmed by hard-core Quakeaholics, it's easier than ever to reach out and frag someone.

Quake is the undisputed king of all 3D. With the even greater *Quake II* looming on the holiday horizon, it's great we can still get down and dirty with the original, whose technology is laying the groundwork for even greater first-person killing experiences.

—Andrew Sanchez

product info

Price $45
Developer Id Software
Publisher GT Interactive
Phone 800.434.2637
URL www.idsoftware.com

MDK

RUN, JUMP AND GLIDE THROUGH THE CRITTERS THAT LITTER YOUR FANTASTIC VOYAGE—THEN ZOOM IN AND BLOW THEIR LITTLE HEADS OFF WITH THE SNIPER MODE.

TRY IT ON THE DISC

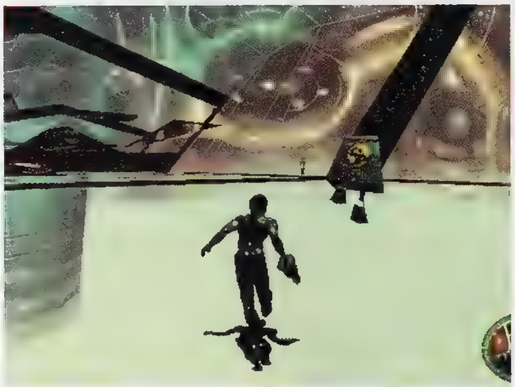
With game publishers holding onto their big titles until the holiday season, picking a "best" game of the year is like picking the Oscars in August. *Quake 2, Unreal, Longbow 2* and *Populous: The Third Coming* are just a few of the titles I'm eagerly awaiting. But until the floodgates open, *MDK* is more than bootWorthy for 1997 technology. With incredible attention to detail, *MDK* shows off the preeminence of the PC as a gaming platform.

The 3D action/adventure game features a virtually infinite horizon, sharply textured environments, and stunning eye-candy in the form of gorgeous transparency effects and reflective surfaces. *MDK* also supports Direct3D in the box, and boasts specific patches for 3Dfx, Rendition, PowerVR, and force feedback (just imagine if every game was written with all your favorite APIs in mind). But don't think that *MDK* is a hardware snob. When not aided by a 3D accelerator, the color dynamically adjusts the 8-bit palette to make it seem like thousands.

The high detail level doesn't stop with the graphics. It's the witty elements—such as the giant taunting robots who wave their asses in your general direction—that will make you savor playing the game to the very end. Of course dropping into sniper mode and blowing off the robots' heads adds immensely to the game's appeal, as well. *MDK*'s meticulous attention to detail gives it fantastic replay value (perhaps second only to *Quake*), and as a 3D action/adventure game it gives Lara Croft a swift kick to her overhyped butt. *—Sean Downey*

product info

Price $50
Developer Shiny
Publisher Playmates
Phone 714.428.2100
URL www.shiny.com



12-STEP

DEALING WITH YOUR **PC OBSESSION** DAY TO DAY BY BREAKING IT DOWN INTO 12 **EASY** STEPS

Stripping And Refinishing Windows 95

It's easy to think of Windows as a perishable OS. Just like milk clumping up in the back of your fridge, Win95 always seems to go bad after a certain date. While a standard installation holds up quite nicely under light use, most of us have grown beyond such training-wheel computing. We expect our OS to handle anything we throw at it.

This month's 12-Step walks you through completely removing Win95 from your system and doing a fresh install. Follow closely and you'll find yourself admiring your reflection through a shiny new Windows.

—Sean Downey

1. Deep Clean

Adding a new video card or SCSI adapter, or even installing DirectX, means you're taking the system's integrity into your own hands. One bad driver will knock you out of commission faster than you can say "fatal error." Install and uninstall enough applications and you'll find yourself in a quagmire of missing dlls and vxds. Accept it. Win95 isn't a robust OS. You're going to reinstall Win95 at least once a year.

And we're not talking about re-installing directly over your old Windows directory. You need to flush out all the excess baggage and system files you no longer need. When you install over an older Windows installation, the setup program doesn't overwrite system files that are newer or of the same date. If one of these files is corrupt, you'll still experience the same problems after the supposed reinstall.

2. Be Prepared

Before rendering your machine inoperable, make sure you have updated drivers for all your hardware. It's always a good idea to pull down the latest and greatest from the web. If this isn't an option, you'll need to track down the original disks or CDs that came with every component (including the motherboard, if it features a new chipset or Ultra DMA). Put the drivers where they won't be harmed by your hard drive purge, such as in a Zip cartridge.

3. In Case Of Emergency, Break Glass

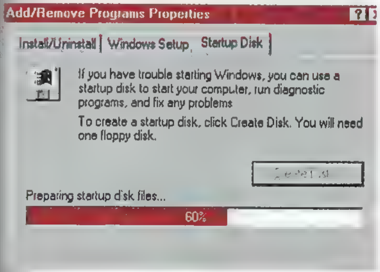
Even if you're not doing a complete wipe of your system, it's still a good idea to do a full system backup. With any irrevocable change, being able to revert to the last known good configuration is a great safety net in case anything goes wrong. The best backup options make it easy to restore your system with only a floppy and your backup device.

4. What's Worth Keeping?

All you really need to pull off your hard drive are the irreplaceable items, such as personal documents and images, e-mails, saved games, and browser bookmarks. Put all your important items onto floppies, or even a removable cartridge such as a Zip or Jaz.

5. Travel Light

Create a Startup disk using the Control Panel's Add/Remove Software utility. Add to this disk DELTREE.EXE and MSCDEX.EXE; both can be found in the Windows\Command directory.



If you have trouble starting Windows, you can use a startup disk to start your computer, run diagnostic programs, and fix any problems

To create a startup disk, click Create Disk. You will need one floppy disk.

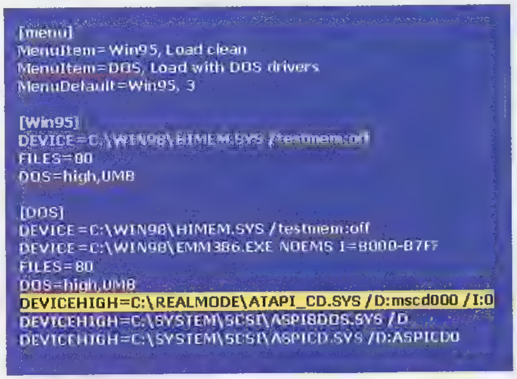
Preparing startup disk files...

Win95 provides a handy way to create a boot floppy with most of the files you'll need to get going again.

6

Adding That Personal Touch

The autoexec.bat and config.sys on the Win95 Startup floppy have generic drivers only. Overwrite them with the autoexec.BAT and config.sys at the root of your hard drive. Create backup copies and then edit the two files, line by line, to call only for items on the floppy. Your boot floppy must give you access to all the hardware and software you'll need to restore Win95. This means locating the drivers according to the path listed in either file and copying them to the floppy. Don't get carried away. You'll only need HIMEM.SYS and your CD-ROM driver (or the ASPI drivers if it's SCSI) from the CONFIG.SYS file. Correct the MSCDEX.EXE statement in your AUTOEXEC.BAT to point at the one on the floppy. If you can't find it, check the DOSSTART.BAT file in the Windows directory. You should now be ready to reboot your system from the floppy.



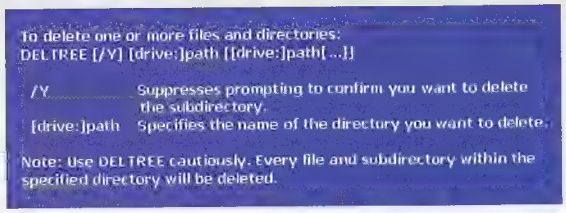
```
[menu]
MenuItem=Win95, Load clean
MenuItem=DOS, Load with DOS drivers
MenuDefault=Win95, 3

[Win95]
DEVICE=C:\WIN98\HIMEM.SYS /testmem:off
FILES=80
DOS=high,UMB

[DOS]
DEVICE=C:\WIN98\HIMEM.SYS /testmem:off
DEVICE=C:\WIN98\EMM386.EXE NOEMS I=B000-B7FF
FILES=80
DOS=high,UMB
DEVICEHIGH=C:\REALMODE\ATAPI_CD.SYS /D:mscd000 /I:0
DEVICEHIGH=C:\SYSTEM\SCSI\ASPI8DOS.SYS /D
DEVICEHIGH=C:\SYSTEM\SCSI\ASPICD.SYS /D:ASPICD0
```

Copy the ATAPI_CD.SYS file (or whatever your CD-ROM driver is named) from the listed location on your hard drive to the floppy and edit the path to reflect this change.

7

Deltree Is Your Friend

DELTREE is a handy DOS command that wipes out entire branches of your directory structure. The directories you should target for termination are Windows, Program Files, and, if you have it, Win32app. After your PC has rebooted from the floppy, type `DELTREE /Y C:\WINDOWS C:\PROGRA~1 C:\WIN32APP` to blow away all three directories.



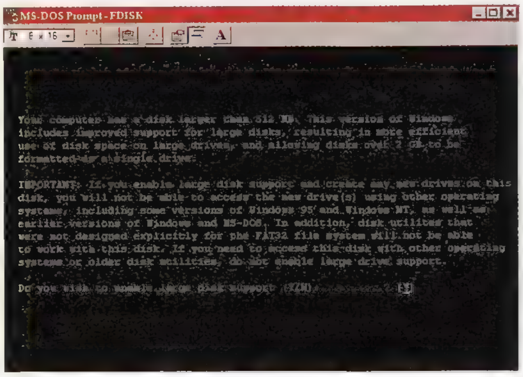
```
To delete one or more files and directories:
DELTREE [/Y] [drive:]path [[drive:]path[...]]

  /Y            Suppresses prompting to confirm you want to delete
                the subdirectory.
  [drive:]path  Specifies the name of the directory you want to delete.

Note: Use DELTREE cautiously. Every file and subdirectory within the
specified directory will be deleted.
```

With great power comes great responsibility.

8

Clean Wipe

If you're installing OSR2, you'll want to FDISK the hard drive and convert it to FAT32 in order to take advantage of its higher capacities and more efficient cluster sizes. Just remember that you can only access a FAT32 volume from Win95 OSR2. This means no dual booting between Win95, DOS, and NT. After deleting and recreating a new partition, you'll need to restart your PC before being able to access it. Type `FORMAT C:\ /S` to format the drive and copy the system files over from the floppy.



```
Your computer has a disk larger than 512 MB. This version of Windows
includes improved support for large disks, resulting in more efficient
use of disk space on large drives, and allowing disks over 2 GB to be
formatted as a single drive.

IMPORTANT: If you enable large disk support and create any new drives on this
disk, you will not be able to access the new drive(s) using other operating
systems, including some versions of Windows 95 and Windows NT, as well as
earlier versions of Windows and MS-DOS. In addition, disk utilities that
were not designed explicitly for the FAT32 file system will not be able
to work with this disk. If you need to access this disk with other operating
systems or older disk utilities, do not enable large drive support.

Do you wish to enable large disk support (Y/N)...........? [Y]
```

FDISK will prompt you in the beginning to enable large disk support—this means FAT32.

9

Call A Cab

Use the MD command to create the Windows directory where you'll be installing Win95. Within this, create a new Cabs directory. Copy the entire contents of the setup directory from the Windows 95 CD-ROM to the newly created Cabs directory and install Windows from here. Besides making for a faster installation, this trick will keep you from searching for your Win95 CD every time you make a change to your system.

10

Drivers! Get Your Drivers!

If the Win95 installation program doesn't have the correct drivers for your hardware, it will prompt you to provide them. Dig up the drivers you backed up in Step 3 and feed them to the system at the prompt.

11

Restore Your Apps And Files

Every application you normally use will now need to be re-installed from the original discs. After re-installing all the necessary apps, defrag your hard drive to complete the clean-up process.

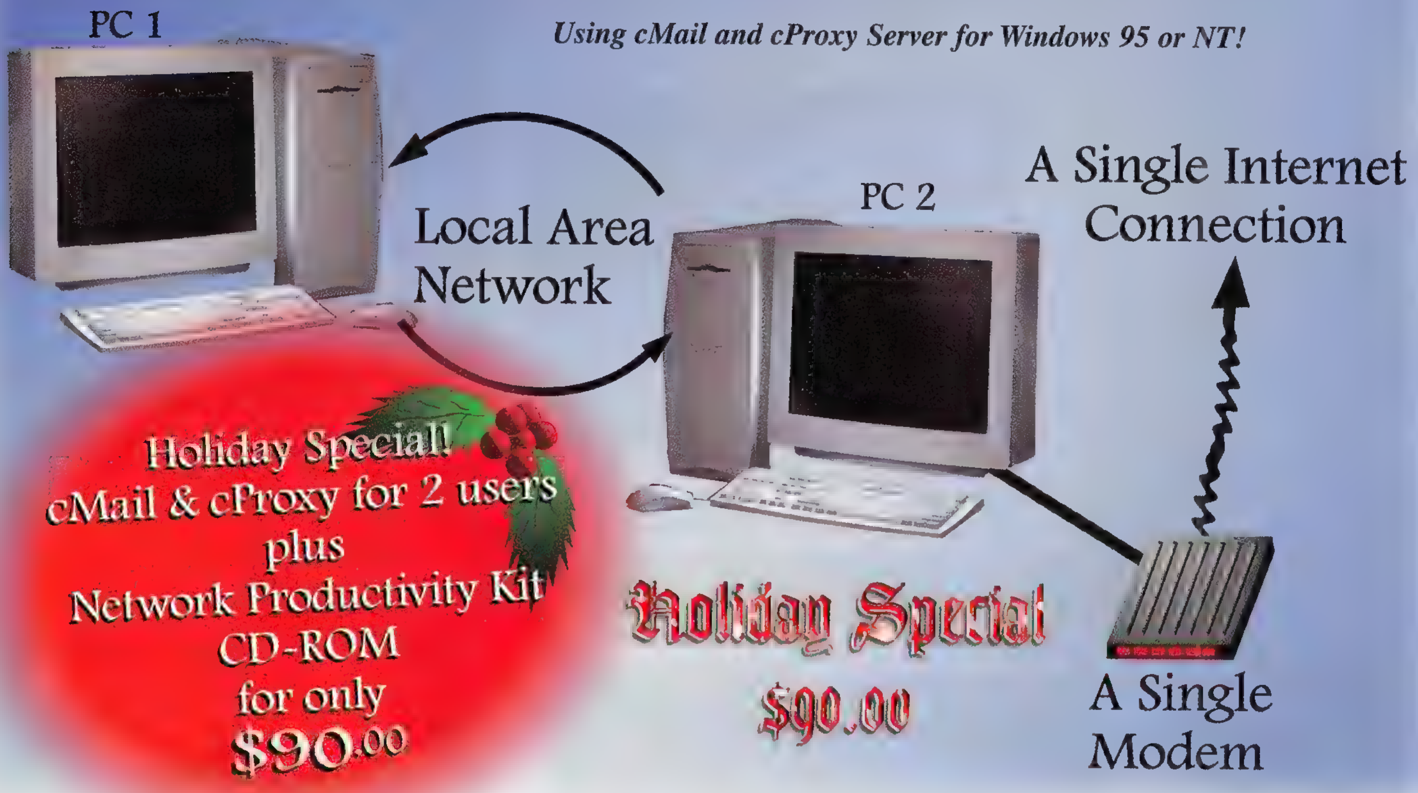
12

Better Than An Enema

You now have a fully optimized, clean installation of Windows 95. You should notice a big speed increase. But soon you'll fill up your system with a new collection of orphaned system files and clutter.

Two PCs sharing the same Internet Connection?

Using cMail and cProxy Server for Windows 95 or NT!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PC 2
A Single Internet Connection
Holiday Special!
cMail & cProxy for 2 users
plus
Network Productivity Kit
CD-ROM
for only
$90.00
Holiday Special
$90.00
A Single Modem

Yes, with cProxy and cMail you can share a single Internet Connection over a LAN network! Why pay the added cost of setting up an additional phone line and Internet Account!

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Product Information Number 186

COMPUTALYNX LIMITED

Identifying Your Mother in a Line-up

I read with sympathy the Clinic letter about not being able to identify a generic motherboard ("Mistaken Identity," *boot* 14, page 65). Luckily, I found a solution when faced with the similar problem of figuring out where to get a manual for a motherboard that bore few identifying marks. American Megatrends was kind enough to tell me how to identify its motherboards, and in the process, how to identify a lot of others! Check out **http://www.ami.com/motherboards/support/identifying.html** for info on how to determine your motherboard manufacturer via the AMIBIOS boot screen and a list of overseas manufacturers. Unfortunately, this only works if you have an AMI BIOS.

Dan

You Guys Rock! (But You're Wrong)

In the Clinic letter "Mistaken Identity," a reader asked you if he could change how Windows 95 identifies his Cyrix 6x86 P150+. Your answer was no. This is not true. Windows 95's CPU identification algorithm checks if bit 21 in EFLAGS register can be modified. If it can, it means that the CPU supports CPUID instruction, and thus Windows 95 detects it as Pentium. Cyrix 6x86 CPU does support CPUID instruction, but it's turned off by default setting. To enable it, bit 7 in 6x86's Configuration Control Register 4 (CCR4) has to be set to 1. This makes Windows 95 detect 6x86 as Pentium not as 486. There is a utility at **www.windows95.com** that does this for you.

Just one more thing. I love your magazine, and think you guys kick butt.

Fraggin Shamblers Frags His Memory

I'm running Win95 on a P133 with 32MB of 40ns DIMM. *Norton Utilities 2.0* System Dr. says I usually have four to five megs of physical memory free. But let me go play *Quake* (even in *WinQuake*) or *Hexen II*, and when I come back from DOS, my free physical memory is like .9! Plus, my memory load is consistently 70+%. I don't have four or five apps open at once, but I do see a lot of 16-bit device drivers\libraries. How can I tell which 16-bit procs to get rid of, if this is my problem? I'm even thinking about overclocking to get better performance.

Rich

Editor-in-chief Brad Dosland replies: *First and foremost, are you experiencing any performance problems? Memory problems usually show up as sluggish response, frequent disk calls, and intermittent crashes. If you're not slogging, this could just be a reporting problem with your utility. Otherwise, this sounds like a load of DLLs creating memory fragmentation. Like hard drives, RAM can fragment with frequent loading and unloading, but this usually requires randomly launching multiple apps and closing them out. Try addressing your problem with Quarterdeck's QEMM memory management utility. And as for overclocking, it should speed up your system, but it won't address your memory problems.*

New Motherboard Induces PCI Trauma

I recently purchased a SuperMicro motherboard with a 266MHz P-II, and installed it with my hard drives and peripherals. Windows 95 acknowledged the new motherboard resources, and then re-found all my peripherals. When I rebooted, Windows never finished booting, locking up the machine with a black screen. I now have a working computer, but I'm forced to use an ATI ISA graphics card. I tried two different PCI graphics cards (Diamond 3D 2000 and Creative Graphics Blaster 3D), both giving the same lockup and black screen. I know both cards work because I tried them in another machine. I believe my PCI bus is working because I have a PCI SCSI adapter running a Zip drive, and that works fine. I also looked in Control Panels for IRQ conflicts, and found none. Any suggestions?

Travis Shrey

Hardware editor Andrew Sanchez replies: *Whenever I benchmark motherboards, I wipe my hard drive, and do a clean re-installation of the OS. This is a drastic measure, but it's the only way you can be assured there's no weird registry corruption. However, if you don't wanna go there, there's a couple of things you may want to do.*

First, make sure the PCI card is seated firmly in the slot. The problem may also be slot choice. When in doubt, install the card in different PCI slots to see if it's some type of bus-mastering problem. Some PCI video cards require a bus-mastered PCI slot, and some motherboards bus-master only the first two or three PCI slots.

Second, try booting the system "stripped" with just your PCI video card and hard drive connected, and with no other cards installed.

If the system boots and runs fine, then there's some type of conflict going on with the PCI cards. If not, try this: With the ISA card installed and the system running properly, check what resources the cards are using (DMA, IRQs, memory addresses). If you can, make a list of which cards are using which resources. Now, go into the system BIOS, and check the settings in the Plug-and-Play section. If the resource allocation is set to automatic, change it to manual. You should now see a bunch of options letting you change IRQ allocation between Plug-and-Play and ISA/legacy. If you're using any ISA cards, make sure you set the particular IRQs to ISA/Legacy, so the BIOS will not attempt to allocate a PCI IRQ to an ISA IRQ. Also, check the Advanced Settings in your BIOS, as well as the manual that came with your PCI video card. See what memory address the PCI card normally sits at, and look at your Shadow Memory address, and if you have the option, Enable Shadow Memory at the same address your video card would use.

Mobile TV Tuner?

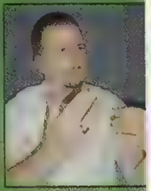
Is there a PCMCIA TV tuner that allows you to watch TV on a laptop? I believe I saw a combo card with a video-capture board and the TV tuner, but is there a plain TV tuner out there? I've searched high and low for one. Please help!

RC Sloan

IRQS ACTING UP? VIDEO **DRIVERS** GETTING YOU **DOWN**? 3D CARDS HAVE YOU CAUGHT IN A **CONUNDRUM**? BOOT **EDITORS** ANSWER YOUR TOUGHEST **PC QUESTIONS**.

Sean Cleveland
disc editor

Brad Dosland
editor-in-chief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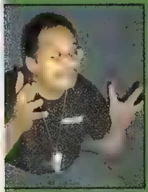
Andrew Sanchez
hardware editor

Sean Downey
software editor

Daevid Vincent
webgoth

News Editor Bryan Del Rizzo replies: *Since I haven't personally used a TV tuner on the road, I also had to search high and low to find one for you. Actually, I found two on the Internet. The first is Kenwood's Notebook TV Card. It features an internal/external antenna and built-in mono speaker, and can receive up to 151 broadcast and cable channels. It also doubles as a capture card (for still images at 640x480/24-bit), and even includes special effects editing software (it sounds like you don't want capture, but it can be difficult to find parts that restrict industry-standard functionality). Requirements are nominal: Only a 486 or Pentium notebook and 4MB RAM required. Unfortunately, you can only order the Kenwood Notebook TV Card from the Damark Catalog at 800.729.8881.*

Nishiden, a Japanese company, also has a PC Card TV Tuner available, but since I can't decipher Japanese text, I can't give you any of the specs. If you're interested, e-mail sugarwara@ sales.nishiden.co.jp. Good luck. And, hey, if any boot *readers actually own one of these devices, give me a ring. I'd love to check 'em out for an upcoming issue.*

A Monster Mess, 3D Notwithstanding

I have a P133 with 32 MB RAM, a Cirrus Logic 5436 2MB video card, and a Panasonic C1381 multisync monitor. I recently added a Diamond Monster 3D card, and now I'm unable to get 1024x768 resolution, either in DOS, Win 3.11 or Win 95. Email/fax/phone calls to all manufacturers' tech support has resulted in zero help. Any suggestions on a possible fix?

Keith Nunn

Technical editor Chris Dunphy replies: *Do you simply not get the option for 1024x768, or does it just look bad? If it's the former, I have no idea what might have gotten screwed up in your system. You might want to try reinstalling Windows and all your drivers. But if your higher resolution screens just look fuzzy now, that might be the fault of the Monster 3D's pass-thru cable. The signal has an extra hop between your graphics card and your monitor, and at higher resolutions it tends to pick up noise and get fuzzy. You may want to try buying a shielded monitor cable. It might help.*

This Error Doesn't Register

This question is probably a stupid question, but it's bugging me. Today I received a box on my desktop that said something like "Windows detected an error in your registry, you can click the button below to replace the faulty registry with a new one by clicking OK and then restarting." I clicked OK, and the box went away–but I don't know what the heck it was talking about. Is this some harmless message that I shouldn't worry about? Please let me know what it meant so I can sleep without wondering what the error message meant.

Troy

Software Editor Sean Downey replies: *Windows 95 and NT, as well as most Windows apps, store information about your computer's hardware configuration, system settings, preferences, fonts, file associations, and more in the Registry. It's essentially a powerful, system-wide database organized into a multi-level hierarchy. Every time you add new hardware or software, the Registry is updated. Some of these changes can occasionally leave other components inoperable, or create problems with other aspects of your system.*

After a successful boot, Win95 makes backups of the Registry so it has something from which to restore if it becomes corrupt. You were lucky enough to have Windows detect the corruption, avoiding a more serious problem. If a Registry corruption keeps Win95 from loading, look on your hard drive for the most recent versions of the Registry backup files, SYSTEM.DA0 and USER.DA0. Renaming them both with the .DAT extension and deleting the corrupted SYSTEM.DAT and USER.DAT files should allow Windows to boot up.

Don't Give Me No DirectX 5.0 Jive

I have a Righteous 3D running in Win95. If I use the latest Righteous drivers, I have no problem. However, if I install the full DirectX 5, I lose the "Drivers" tab in Device Manager for the card. The only way to get it back is to totally uninstall the card, including removing inf and bin files. If I just install the core DirectX 5.0 files (no audio or display drivers), there's no problem, but then I don't get the benefit of the DirectX 5.0 Direct3D improvements. DirectX 5.0 also changes the entry in Device Manager from a Righteous card to a 3Dfx Voodoo card, and changes the Righteous Display Properties tab to a Voodoo tab. Any suggestions?

Jym Schwed

Technical editor Chris Dunphy replies: *You have discovered one of the more insidious aspects of DirectX. When you install DirectX, it checks to see if the drivers you currently have are certified. If they're not, it will over-ride them with generic versions provided by Microsoft. The Righteous 3D drivers you're using have not been through Microsoft test labs, and thus come up as uncertified, and are overwritten by a generic 3Dfx driver. You need to bother Orchid and request a certified driver. Meanshile, you should be able to get things to work by installing DirectX 5.0 first, then installing the Righteous driver on top of it.*

Click-Clack, My Monitor's Whacked

I have an STB Powergraph 64 3D video card with an S3 ViRGE graphics accelerator and a Princeton Graphics EO50 monitor. After updating to new drivers for my video card, my monitor clicked whenever Windows 95 booted up. I received the new drivers from a trial version of SciTech *Display Doctor*. After rebooting my computer with a variety of different drivers, I found that only one set (an S3 ViRGE set, not a set made specifically for Powergraph 64) would run without making my monitor click.

Now, upon purchasing my first issue of *boot*, issue 14, I'm even more turmoil. With great unease I decided to load the updated drivers for my video card that accompanied the DirectX 5 .0 software. But now my monitor is clicking again! Should I be worrying about this, or is it just meaningless? My video works fine once I'm in Windows. Still, it doesn't seem right. My monitor never clicked with the older S3 drivers. If you could supply any answers, I'd be grateful.

Also, The *MDK* Performance Test gave my system a paltry 40 rating (which fell below even a P90), yet I have a Cyrix 6x86 P150 (which actually runs at 120 MHz, of course) with two megs of graphics acceleration. Is this just a fluke in testing because of my Cyrix processor, or should this also—like my clicking monitor—be a call for concern?

Shawn Cox

Technical editor Chris Dunphy replies: *If your monitor is just clicking once per boot, I wouldn't worry–it's just resyncing to the signal from your graphics card. But if you ever hear a repetitive clicking or a buzz, turn off your monitor right away. It may be permanently damaged if you leave it trying to sync to an out-of-range signal for too long. As far as different drivers clicking or not clicking, you can simply chalk it up to the idiosyncratic ways in which they initialize.*

If MDK *plays fast enough for you, I wouldn't worry too much about the PerfTest result. The ultimate benchmark is your own eyes, and if it's fast enough for you, so be it. But you might want to try running* MDK *and the PerfTest on a friend's machine. You might notice a huge difference.*

Help Me Embarrass My Boss

I'm the PC specialist for a school district, and I'm trying to prove my boss wrong. I told him that no Socket 7 Pentiums can cache RAM over 64 MB, so that should be all the memory you should put into a system that's going to be doing something demanding, like playing *Quake* or *Hexen II*. I know I've read about this in several magazines, including *boot*.

snarfo

Hardware editor Andrew Sanchez replies: *RAM caching is dependent on the core-logic PCIset that your system is using. The only Intel Socket 7 PCIset that supports RAM caching past 64MBs is the 430HX. Now, if you're talkin' about non-Intel core-logic PCIsets, such as those from SiS, VIA and AMD, these can cache memory well past 64MB (some up to 256MB!). So you're not correct, but you probably know more than your boss. Read our August 1997 cover story ("Pentium Killers,"* boot *12) for the whole story on Socket 7 warfare.*

E-mail clinic@bootnet.com to deliver your fearsome queries. If you're having trouble with a particular system, make sure to note your full configuration.

AD INDEX

COMPANY	PAGE NUMBER	PRODUCT INFO NUMBER	URL
A2Z Computers	148	86	www.a2zcomp.com
Accolade	42	82	www.accolade.com
Adaptec	9	87	www.adaptec.com
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ATI	4	85	www.atitech.com
Axis Computers	146	88	www.axis.com
ComputerStar	149	121	800.981-8489
Creative Labs	102	101, 102	www.creativelabs.com
Creative Labs	C4	96	www.creativelabs.com
Creative Labs	101	116	www.creativelabs.com
Dell Computer Corporation	32	—	www.dell.com
Diamond Multimedia	82	—	www.diamondmm.com
Eidos Interactive	97	129	www.eidos.com
Electronics Boutique	144	131	www.ebworld.com
Enorex Microsystems	116	133	www.enorex.com
Fox Interactive	28	132	www.foxinteractive.com
GT Interactive	56	151	www.gtinteractive.com
Guillemot International	91	156	www.guillemot.com
IBM Corporation	15	185	www.ibm.com
Imation	30	—	www.imation.com
Intergraph Computer Systems	22	18	www.intergraph.com4
Intergraph Computer Systems	C2	182	www.intergraph.com
Jazz Multimedia	C3	187	www.jazzmm.com
JC Research	78	186	www.game-club.com
MediaOn/Artek	140	236	www.mediaon.com
Micron Electronics, Inc.	70	106	www.mel.micron.com
Microprose	26	243	www.microprose.com
Microsoft	11	—	www.microsoft.com
Microsoft	48	—	www.microsoft.com
Microsoft Explorer	61	—	www.microsoft.com/ie/
Microsoft Explorer	63	—	www.microsoft.com/ie/
New World Technology	145	254	www.nwt.com
Nova Logic	55	256	www.novalogic.com
Olympus	124	260	www.olympus.com
Panasonic Interactive Media	136	—	www.gopostal.com
PowerQuest Corporation	106	281	www.powerquest.com
Sejin America, Inc.	24	306	www.segin.com
Sierra On-Line	111	312	www.sierra.com
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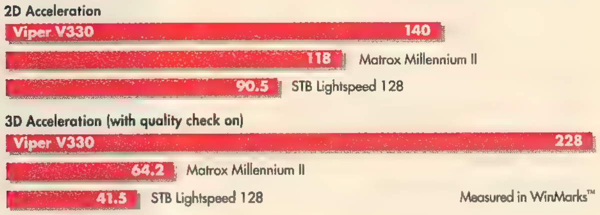

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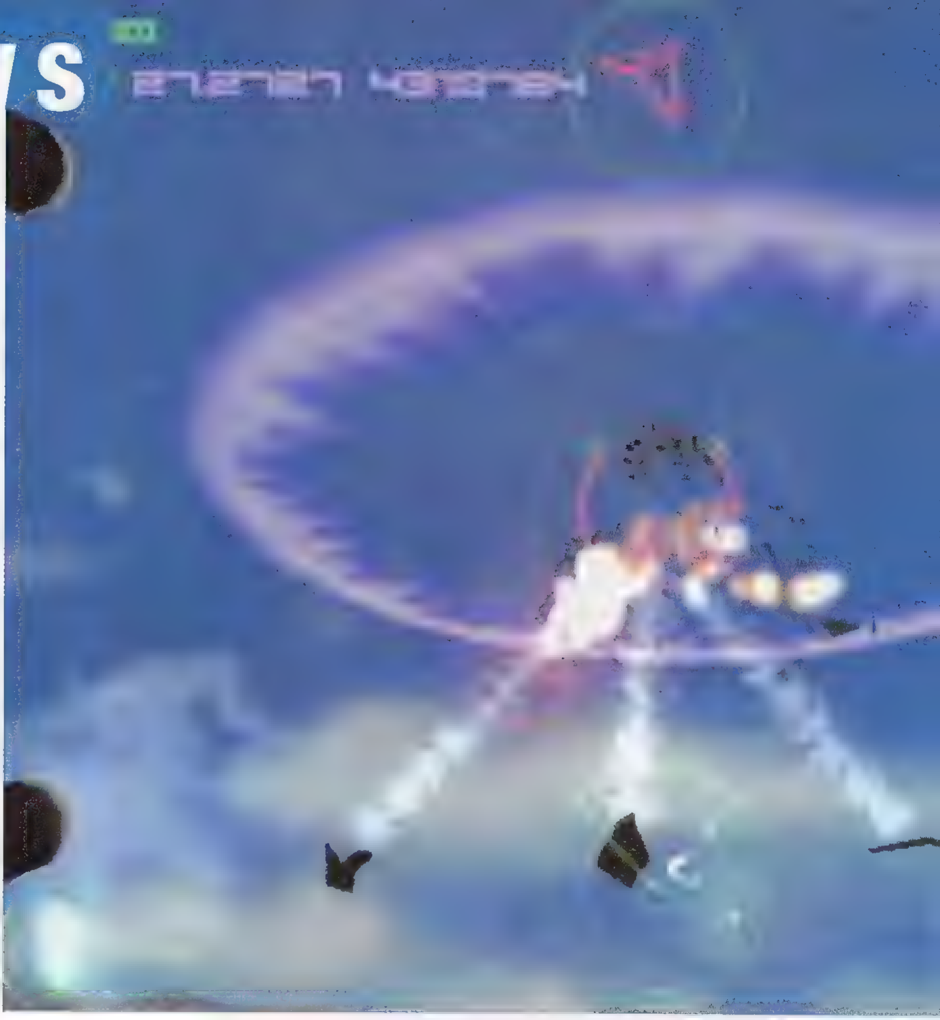


Incoming

Hit the deck!

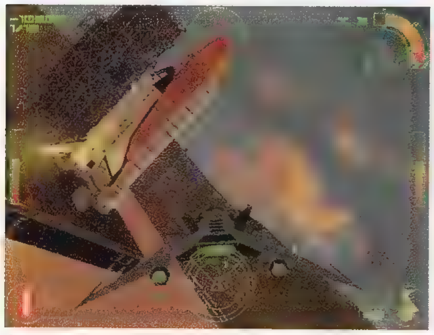
Originally conceived as a 3D version of Missile Command, Incoming *is a futuristic arcade shooter whose state-of-the-art 3D worlds are coupled with relentless adrenaline-pumping action. Rage Software has unleashed an arsenal of effects to make the most beautiful graphics engine we've seen to date. The smoke generator alone made our jaws drop in awe. We spoke with* ***Ian Moran****, lead programmer at Rage, and asked him to fill us in on the game that Andy Grove used to show off Intel's newest technologies at this year's E3 trade show.*

boot What advances will* Incoming *bring to the PC shoot-em-up?
Moran Incoming supports all leading 3D graphics cards via DirectX 5.0's D3D to achieve resolutions and frame rates equivalent to the very latest arcade releases. From the outset, it was to fully harness Pentium II and AGP. The game offers a vast arsenal of weapons and craft including AT-AT, guns, lasers, tanks, rocket launchers, aircraft, and helicopters across 42 amazingly diverse missions and four highly detailed worlds. The game switches seamlessly from ground-based defense to full-on airborne attacks.

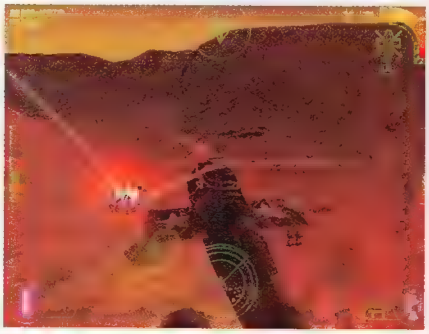
boot What kind of units will the player command in your game?
Moran Commanche 3 and S/VTOL AV 8B night-capable Harrier aircraft derivatives, among others. These will add depth and longevity in both the single and multiplayer modes via significantly disparate flight models and dynamics. Land-based units include futuristic hovercraft, hovertanks, missile batteries, lasergun emplacements. Airborne aircraft include helicopters, gunships, numerous planes including fighters, and the incredibly versatile AV 8B night-capable Harrier tank busters. All crafts have both a primary and secondary weapon system. For example, the S/VTOL jet fighter may be armed with a primary laser cannon, and air-to-air guided missiles as the secondary. Players will be able to select multiple permutations from a vast and satisfyingly destructive array of weaponry. We're shooting for the right level of tremendous gratification through wanton destruction.

boot Will* Incoming *require a 3D accelerator card?
Moran It's a hardware-accelerated-only title, since the extra power the new cards provide allows us to use more polygons, textures, colors, and models per frame than software alone could ever cope with. Also, while the hardware is drawing up loads of sexy semi-translucent shockwaves or explosions, the processor is free to do something more useful, such as handling the full-fledged dynamic lighting engine. 3D cards have become essential for optimum PC gaming visual enjoyment. Playing a game without an accelerator is like playing a game with no sound, like smoke without fire, et al.

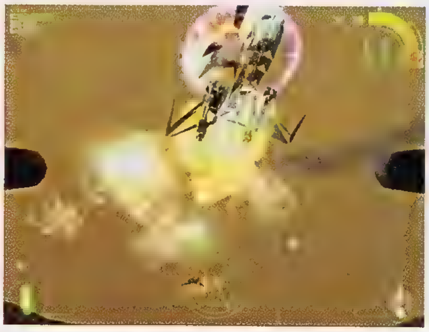
boot Any plans to port for specific 3D cards?
Moran We're considering ports to native APIs where the game gains a genuine advantage. I think I should state, however, that the newer D3D drivers are vast



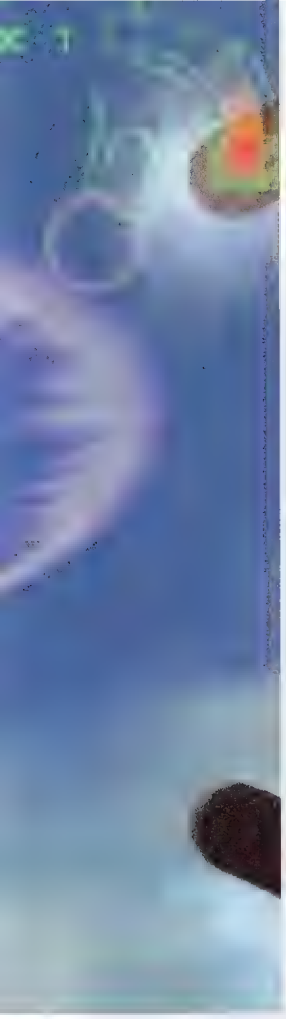
One of the later missions puts you in a captured alien fighter to defend the space shuttle launch.



Incoming's beautiful smoke particle system makes it a shame to have a limited supply of missiles.



The spectacular explosions are a 3D-accelerator-only treat. Simply spectacular.



With its shockwave explosions, Incoming hopes to supplant the lense flare as the most over-used special

improvement over the first generation, which means that we're finally experiencing excellent levels of performance from our optimized 3D engine.

***boot* Which 3D chipset shows off Incoming the best?**

Moran 3Dfx Voodoo was the immediate favorite. However, with AGP, the chips from nVIDIA and Intel are extremely cool. We'll enable the majority of 3D accelerators through D3D, but our current texture requirement is prohibitive of cards without a compression scheme or 4MB of memory.

***boot* What impact do the new 3D special effects in Incoming have on the game?**

Moran We make very heavy use of the hardware for blended textures in order to allow smoke particles to blend beautifully as they fade away from the glowing missile engines. The yellow glow from these engines are then projected on the surrounding craft, buildings, and landscapes just before it explodes on impact, scattering particles and burning debris, which incidentally also light up the environment. Another nice feature, reflective environmental mapping, gives us cool shiny alien structures and craft. We're lucky that the emerging technology has allowed us to experiment with areas that would have previously been unfeasible.

The rocket yellow glare lights up the entire valley.

***boot* What will AGP do for Incoming ?**

Moran AGP opens the flood gates on the texture bottleneck. Using system memory for textures gives you extra texture memory virtually for free. This means we're able to allocate more textures of larger size and all in resplendent 16-bit colors.

***boot* How many polygons can the game engine push?**

Moran The 3D engine peaks at around 10,000 high-definition 16-bit color texture-mapped, perspective-correct, bilinear-filtered, dynamically-lit polygons per frame. In addition to this we make heavy use of environmentally shaped and alpha-blended texture maps adding tremendous quality to the rendered image. Finally, features such as anistropic filtering will be enabled for cards that are able to handle it.

***boot* How big is Incoming's gaming world? Are there any limits to the number of units on screen at one time?**

Moran The current gaming arena is 28 square kilometers, but we're expanding this area to allow for a suitable theatre for fierce aerial combat when using the jet aircraft. Theoretically, there's no fixed limit to the overall number of units, but gameplay dictates practical and physical limits that must be adhered to.

***boot* What sort of advancements have been implemented in opposing forces' AI?**

Moran The game uses an intelligence description language that allows us to provide specific intelligence for dynamic types or a specific craft, which gives the game tremendous variation and depth. The result is a genuine repeat play due to non-linear or wholly unexpected responses that avoid obvious and standard enemy responses.

***boot* Are you implementing other technologies in Incoming?**

Moran Both force feedback and 3D spatial sound have already been implemented, taking the gameplayer to the next level of immersion and realism.

***boot* Are there any plans to use this new 3D engine for a pigeon simulation?**

Moran You're nearly correct, but it will actually be a British Leland Sandglow yellow Budgerigar simulation.

product info

Available March 1998
Price TBA
Developer Rage Software
Publisher TBA

HARDWARE ON THE HORIZON AND SOFTWARE SOON TO SHIP

Incoming 84
Battlezone 87
SiN 88
Joint Strike Fighter 90

The boot Tracking Sheet

TITLE	DEVELOPER	DATE
GF-1000 DVD RAM	**Hitachi**	**Dec-97**
AMD K6 266MHz	**AMD**	**Dec-97**
Cyrix 6x86-MX PR-300	**AMD**	**Dec-97**
AMD K6 300MHz	**AMD**	**Dec-97**
AMD-640 100MHz/ AGP PCIset	**AMD**	**Dec-97**
Cyrix MediaGX MMX	**Cyrix**	**Dec-97**
Quake II	id	Dec-97
Unreal	Digital Extreme/ GT Interactive	Dec-97
Longbow 2	Jane's/EA	Dec-97
Blade Runner	Westwood/Virgin	Dec-97
3D Baseball	Microsoft	Dec-97
European Air War	Microprose	Dec-97
Falcon 4.0	Microprose	Dec-97
Guardians: Agents of Justice	Microprose	Dec-97
Jack Nicklaus 5	Accolade	Dec-97
Lunatik	Pure Entertainment/ Psygnosis	Dec-97
The Dark Project	Looking Glass Technologies	Dec-97
WarCraft Adventures: Lord of the Clans	Blizzard	Dec-97
Wing Commander: Prophecy	Origin/EA	Dec-97
Half-Life	Sierra On-Line	Jan-98
Dominion Storm	Ion Storm/Eidos	Jan-98
Redline	Accolade	Jan-98
Rebellion	LucasArts	Jan-98
Deathtrap Dungeon	Eidos	Jan-98
Adrenix	Digital Dialect/PIE	Jan-98
Forsaken	Acclaim	Feb-98
Formula 1 Championship Edition	Psygnosis	Feb-98
Star Trek: First Contact	Microprose	Feb-98
F22 Air Dominance Fighter	DID/Ocean Int'l	Jan-98
Ultim@te Race	Kalisto/Microprose	Feb-98
Extreme Tactics	Media Station	Feb-98
Intel Pentium II 333MHz/Slot 1	**Intel**	**Mar-98**
Apollo VP3 PCIset 100MHz/AGP	**VIA Technologies**	**Mar-98**
SiN	Ritual/Activision	Mar-98
Dark Vengeance	Reality Bytes	Mar-98
Daikatana	Ion Storm/Eidos	Mar-98
Streets of SimCity	Maxis	Mar-98
Battlezone	Activision	Apr-98
Trespasser	DreamWorks	Apr-98
SoftImage v4.0 (sumatra)	Microsoft	Apr-98
F22 Total Air War	DID/Ocean Int'l	Apr-98
Intel Deschutes/Slot 2	**Intel**	**Oct-98**
Intel Mobile Deschutes	**Intel**	**Oct-98**
MechCommander	Microprose	Q2/98
Anarchy	Microsoft	Q2/98
OutWars	Microsoft	Q2/98
Riot	Microsoft	Q2/98
10th Planet	Bethesda	Q3/98
Windows 98/Memphis	Microsoft	Q3/98
Duke Nukem Forever	3D Realms	Q3/98
MechWarrior III	FASA/Microprose	Q3/98
Star Trek Klingon Honor Guard	Microprose	Q3/98
Windows NT 5.0	Microsoft	Q3/98
10th Planet	Bethesda	Q3/98
Prey	3D Realms	Q4/98
Starship Trooper	Microprose	Q4/98

*These dates are subject to change
**Bold indicates hardware

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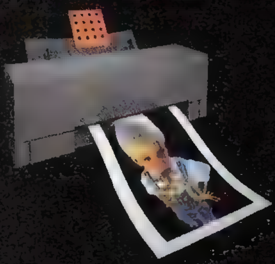

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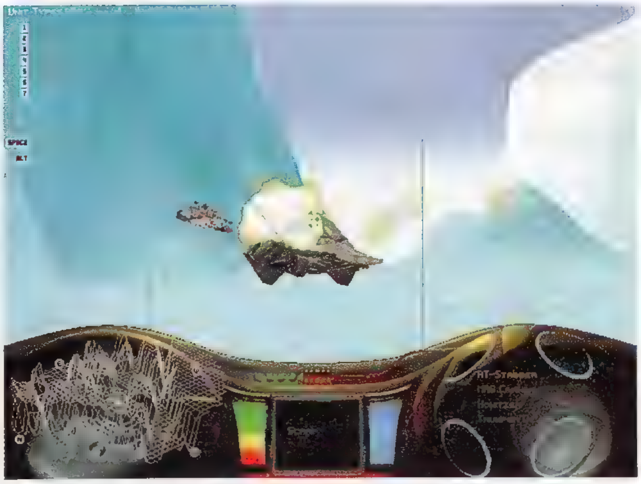
Battlezone

Turret Syndrome

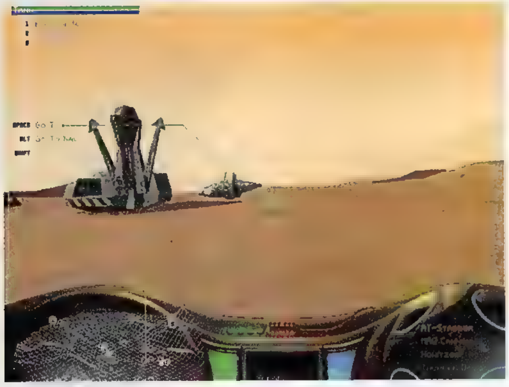
Battlezone *was an arcade classic set in a wireframe landscape. Activision has given this original tank's-eye-view frag fest a makeover, complete with strategy elements and bombastic 3D effects. We targeted the game's director,* **Andrew Goldman***, and fired off some questions about this quantum-leap sequel.*



The wireframes are gone but the battle goes on with Battlezone.

***boot** Beyond remaking the original* **BattleZone** *with texture-mapped polygons and 3D effects, what can we expect from this new version?*

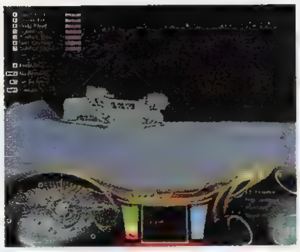
Goldman The original *Battlezone* was the first 3D game ever, and we're determined to make the new one every bit as revolutionary. Working at Activision, we've been able to draw on the experiences of *Mechwarrior II*, *Interstate 76*, and *Dark Reign*. Most importantly, the company has given the team the latitude to experiment and learn. We've spent over 18 months working through the interface, game play mechanics, and technology to combine the intense and immersive experience of an action game with the variety and depth of a strategy game. We spent all that time making one mission that would convince people you could command an army in real-time without ever leaving the first-person point of view.



Keyboard commands give you a quick way to bark orders to your units.

boot** How has* **Battlezone's interface eliminated the need for the traditional real-time strategy top-down view?*

Goldman The key is a simple HUD containing all the necessary information for commanding forces. We've taken the traditional outdoor action-game radar and transformed it into a 3D topographical map of the battlefield. The topomap works with the command system to show the locations of all of your units. Through this interface, the player can easily build units and command his forces around the map without ever leaving the middle of the action.



The dark side of the moon is the setting for the first conflict.

***boot** What will the computer opponents in* **BattleZone** *act like?*

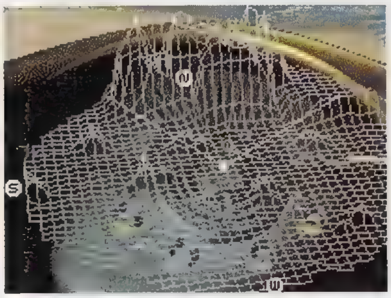
Goldman We started with *Dark Reign*'s AI system, but we've modified it. Like *Dark Reign*, we've got a strategic-level AI playing the game by the same rules as the player: exploring the map, gathering resources, and making building choices. It's truly amazing that we could build a map, plop down some resources, drop in the base level factory for each side, and then play through a fun and challenging mission. No scripting needed.

***boot** The* **Battlezone** *graphics engine was borrowed from* **Interstate 76.** *How far has the engine progressed beyond the original?*

Goldman We began with the *Interstate 76* engine, but we've actually rewritten most of the engine. It's significantly faster, and it looks better. The engine does an amazing job of simulating real-world situations. The realistic feel of our vehicles and weapons is directly attributable to the work that went into *I-76*. The advanced path-finding and AI in *I-76* allowed us to do realistic troop movements. I don't know of too many real-time AI systems that could find their way through a maze.

***boot** Are there limits to the number of units on screen? How far does each terrain extend?*

Goldman The player has to gather and then spend resources in order to build units. And the finite resources in the world limit the number of units that can be built. That said, nobody who has played the game has asked for more units. As for the terrain, the technology can support much bigger worlds, but we've found that two kilometer by two kilometer worlds make for the best game play. This size seems to keep the action focused while also limiting the "commuting" time.



Battlezone*'s 3D topographical radar map goes a long way to supply total battlefield awareness.*

Battlezone*'s two campaigns allow you to play as the U.S. or the Soviet Union.*

boot** Are there plans for a huge Internet multiplayer arena for* **BattleZone?*

Goldman You can be sure that we'll support huge multiplayer arenas. We've got the game working in multiplayer mode now, so *Battlezone* will use Activision's free Internet service.

product info

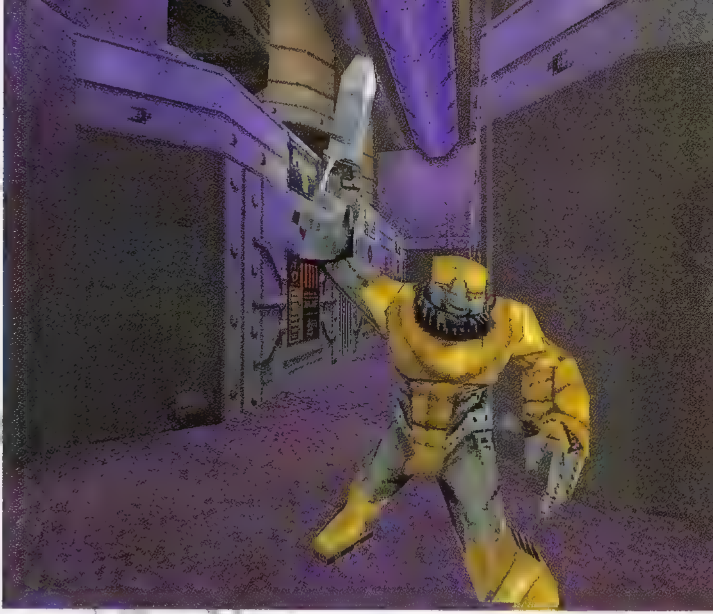
Available April 1998
Price TBA
Developer/Publisher Activision
Phone 310.473.9200
URL www.activision.com

SiN

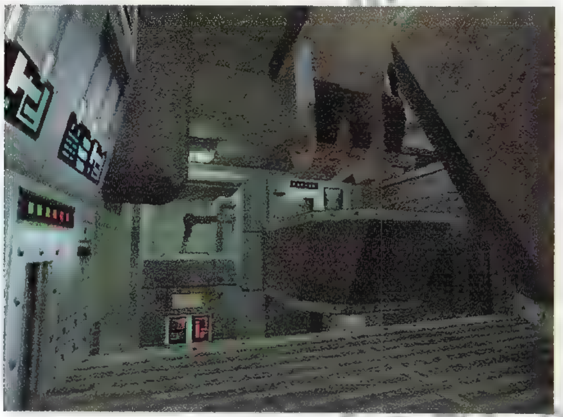
Quake *with a guilt complex*

By mixing gameplay elements with a cohesive storyline in which every action has a consequence, SiN *promises to bring the first-person shooter to new levels. Just how far can Ritual take the* Quake *engine—adding skeletal mesh animations and environmental scripting—before it's not just another* Quake *clone? We asked* ***Joe Selinske****, Product Manager of* SiN.

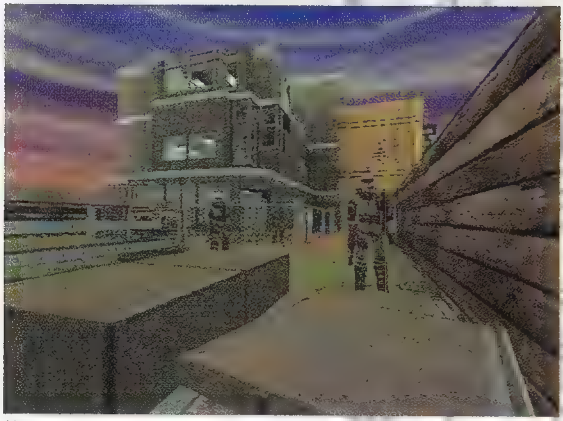
boot ***What is the plot behind*** **SiN*****?***
Selinske One hundred years in the future the police go corporate because the overburdened government has lost its long, hard battle with crime. Your character is Colonel John Blade, head of a hard-hitting corporate security force—sec-force—team specializing in crime prevention and elimination. You're currently tracking down the source of a highly addictive drug called "U4," because strange things have been happening to its users. It is up to Blade to figure out who or what is behind this unexplained phenomenon now plaguing the streets and put a stop to it.



Dark Captains use **SiN*****'s colored light sourcing and laser prod to shock you up.***



Each level is packed with enough moving equipment to run a small factory. And they ain't makin' ball bearings here, OK?



SiN***'s resplendent levels aren't limited to interiors alone.***

The elaborate puzzle unfolds and leads back to Elexis Sinclair, a brilliant biochemist who will stop at nothing to get what she wants. She wants to push the evolution of mankind ahead by a thousand generations. Evolution to her means mutation to others.

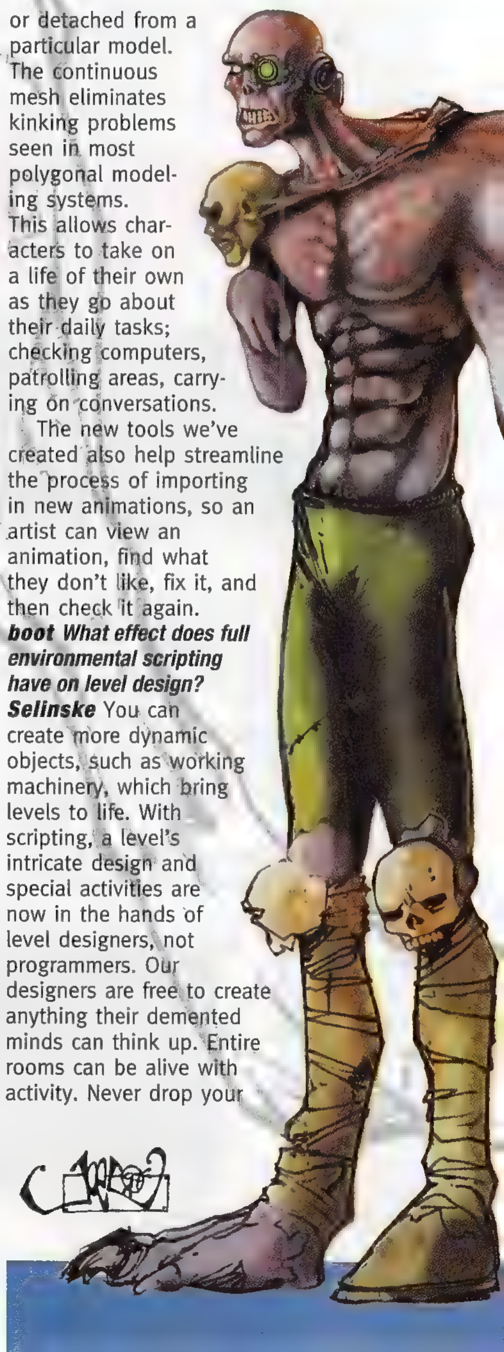
boot ***How far have you taken the*** **Quake** ***engine beyond the original?***
Selinske Actually, we only started with the *Quake* engine. We'll use *Quake II* technology once it ships. So anything in *Q2* will be in our game, plus we've added cool features beyond *Q2*. We wanted to make a game that will compete against anything coming out now or next year.

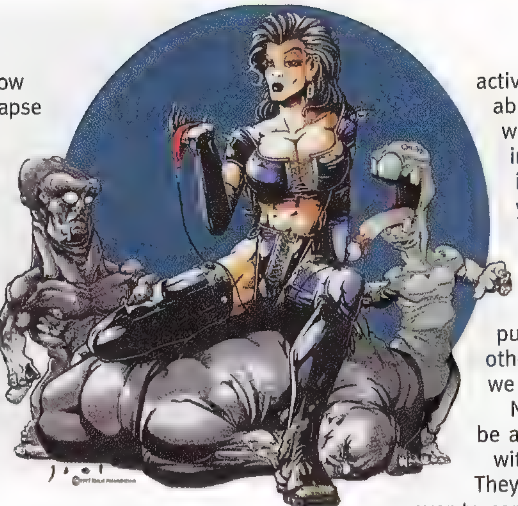
We've added 16-bit textures, a new skeletal mesh system for more dynamic and diverse animations, 360-degree environment maps that surround our worlds, and colored lighting—software and hardware. A deep inter-woven story that unfolds throughout the game, and new scripting, bring more depth and connectivity to our environments, with actions in one level affecting other levels. We know we have tough competition, and we're going to pull out every trick to make sure that we exceed all expectations.

boot ***Ritual's using a new continuous mesh skeleton modeling system in*** **SiN*****. What advantages are you hoping to gain by this?***
Selinske The new system lets us create more diverse animations without any specific limit on the number created, and allows objects to be dynamically attached or detached from a particular model. The continuous mesh eliminates kinking problems seen in most polygonal modeling systems. This allows characters to take on a life of their own as they go about their daily tasks; checking computers, patrolling areas, carrying on conversations.

The new tools we've created also help streamline the process of importing in new animations, so an artist can view an animation, find what they don't like, fix it, and then check it again.

boot ***What effect does full environmental scripting have on level design?***
Selinske You can create more dynamic objects, such as working machinery, which bring levels to life. With scripting, a level's intricate design and special activities are now in the hands of level designers, not programmers. Our designers are free to create anything their demented minds can think up. Entire rooms can be alive with activity. Never drop your




Besides being the arch-villain, Elexis Sinclair doubles as a playable character in multi-player mode.

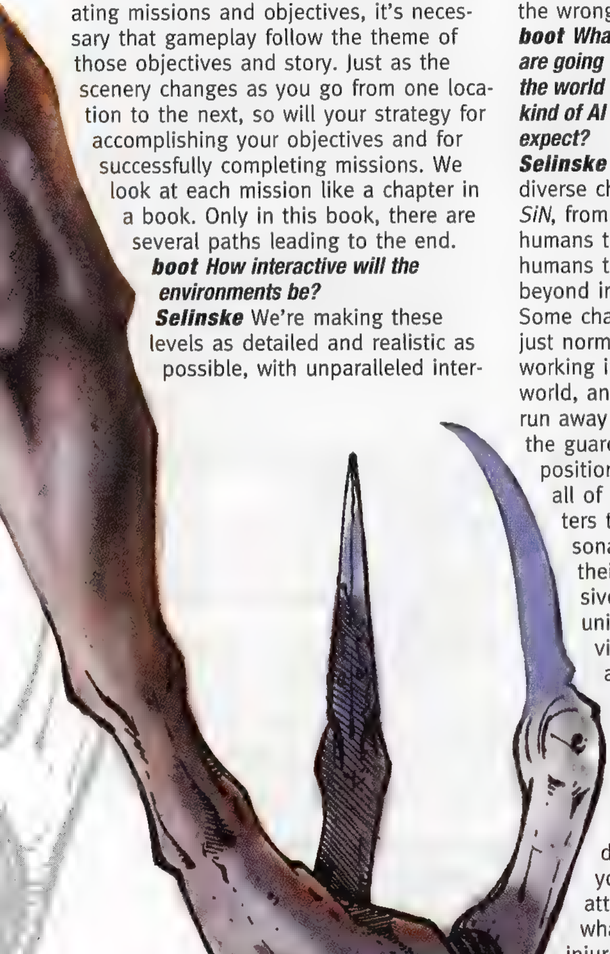
guard. You never know when a wall will collapse on you, or when the stairs will drop out and send you crashing down.

***boot** Is SiN's gameplay similar to Quake's find-the-key-and-dash-to-the-exit paradigm, or are there different methods of resolution?*

Selinske There is no one style of gameplay throughout the game. It depends on your personal style of play, your location in the game, and your current objective. For example, the purpose of one area of the game may be a pure chase scene, whereas the very next level requires more stealth and thought. By creating missions and objectives, it's necessary that gameplay follow the theme of those objectives and story. Just as the scenery changes as you go from one location to the next, so will your strategy for accomplishing your objectives and for successfully completing missions. We look at each mission like a chapter in a book. Only in this book, there are several paths leading to the end.

***boot** How interactive will the environments be?*

Selinske We're making these levels as detailed and realistic as possible, with unparalleled interactivity. You'll be able to interact with everything in our worlds. If it looks like you can use it, you can. Blow it up, break it, use it, drive in it, push it, or any other crazy thing we can think of. NPCs will also be able to interact with the world. They should run over to computer terminals and lock you out, or activate security systems. Some characters will be even more devious and drop crates on you if you're in the wrong place at the wrong time.



***boot** What monsters are going to inhabit the world of SiN? What kind of AI can we expect?*

Selinske We have diverse characters in *SiN*, from normal humans to mutated humans to mutations beyond imagination. Some characters are just normal people working in the world, and will even run away and alert the guards of your position. We want all of our characters to have personality, be it their aggressive behavior, unique survival adaptability, or one of a hundred other qualities that make them unique.

AI is the most important character feature any game must have. The AI needs to be very diverse and unique in how it deals with problems—such as you—in the world. How they attack—aggressive or defensive; what they do when they are injured—like running away and healing themselves; calling for backup when they feel trapped. With all of the tough competition coming out, we have to work hard just to make the grade.

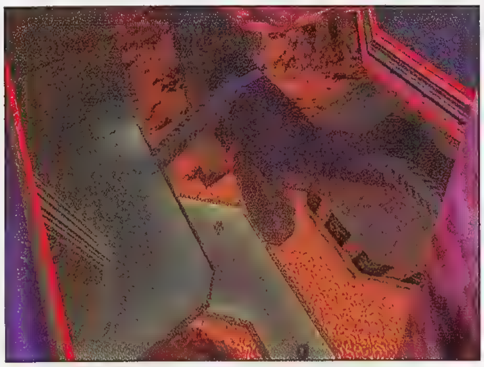
***boot** How will multiplayer be handled? Will there be special missions or specific combat arenas?*

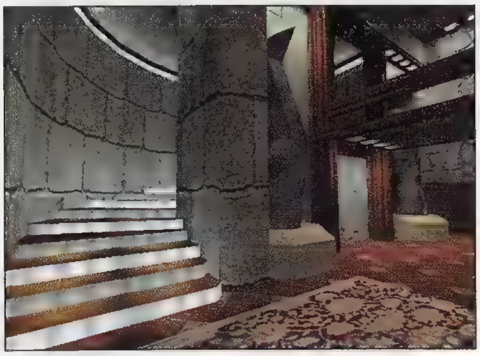
Selinske We know DM adds to the longevity of a product and with all the DMers around here, we'll have some very intense DM levels separate from the game levels. We don't want to hamper single-player gameplay by trying to make DM work within those levels. Having said that, there are still many good game levels that will be fun to play in DM, and we'll allow you to play whatever you want.

***boot** What sort of level editor will be released with SiN? How easy will the editor be to use?*

Selinske When we started *SiN*, we wanted to make sure that support for the user community would be there when the game finally shipped. As a result, we're using two different editors in house. The first is based on *QuakeEd* with a lot more user-friendly features. The second is *BSP* written by Yahn Bernier. We've worked closely with Yahn throughout the development of the project and feel that *BSP* will be one of the best editing tools available for *SiN*.

As far as ease of use is concerned, all I can say is that we have three different level designers here with three very different personalities and editing styles. If they can use the editors easily, then I'm sure the public won't have a problem.


If you sit quietly and watch, characters will converse with each other and possibly scratch themselves.


SiN*'s 16-bit color depth and light sourcing bring even the simplest entry way to life.*

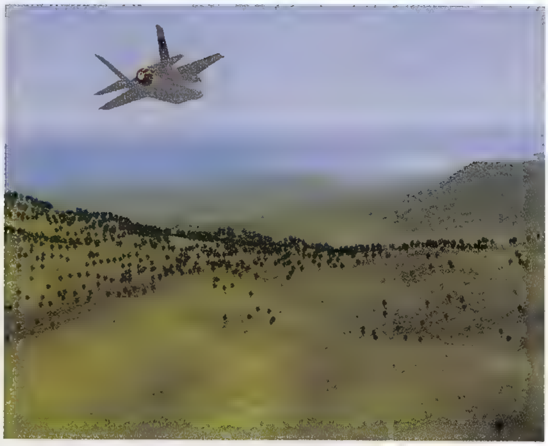
product info

Available March 1998
Price $50
Developer Ritual Entertainment
Publisher Activision
Phone 310.473.9200
URL www.ritual.com

Joint **Strike** Fighter

Piloting the future of avionic design

Joint Strike Fighter *is the first flight sim to plop you into the cockpits of the Pentagon's two multi-role jet fighter prototypes. While neither plane has ever been flown, Innerloop Studios believes it has accurately modeled the performance of each. boot interrupted games Managing Director* **Henning Rokling***'s feverish work to discuss the game.*



JSF's *flight engine pushes the terrain horizon to infinity and beyond.*

***boot* Tell us about the joint strike fighters featured in the game?**

Rokling The Boeing X-32 and the Lockheed-Martin X-35, now being built as prototypes, are set to fly in early 1998. They are the most advanced jetfighters in the world.

***boot* How realistic are the different cockpits?**

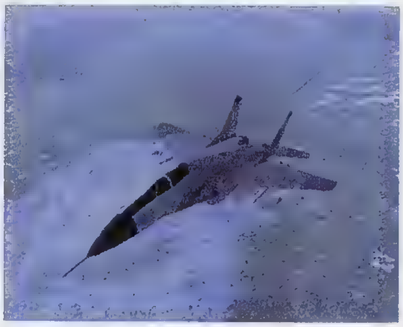
Rokling The cockpit is created with polygons, and the MFDs are texture maps being updated real-time. It's based upon images from Boeing and Lockheed-Martin, and is as realistic as it can get. Much emphasis is being put on keeping it conventional, and the features we have in *JSF* will definitely be in the prototypes.

***boot* What campaigns will JSF feature?**

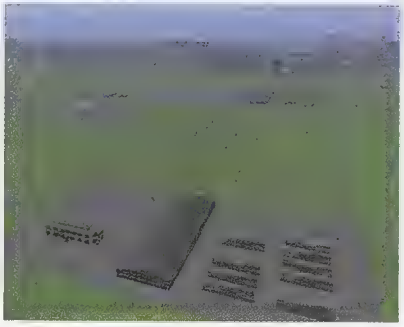
Rokling Afghanistan, Colombia, Korea and the Kola Peninsula. In both Afghanistan and the Kola Peninsula, it's the Russians who are your main threat. In Colombia, there's been a coup d'etat. Drug lords now control the country's military forces, and F-16s and Mirages are your enemies. In Korea, guerilla forces are out of control. Enemy planes mainly consist of Su-27s, MiG-29s, Hind helicopters, Tupolev bombers and Su-35s.

***boot* What kind of flight model are you shooting for in JSF?**

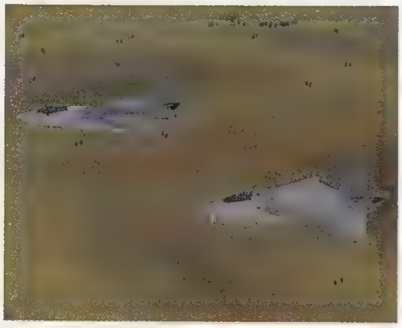
Rokling We've put an enormous amount of time and money into research. Each JSF is made up of 1,000 polygons in-game, which should satisfy even the most die-hard sim-head. All the aircraft, vehicles, and generic objects have been researched to death. For each campaign, tons of books have been read to get a feel for each terrain we're reconstructing, although I have to admit that none of us has ever been to Afghanistan.



There are 1.125 billion billion polygons in the terrain this Tomcat's flying over. Can you count them?



Adding weather effects to the mix doesn't slow down the game's framerate.



The X-32 and the X-35 haven't been built yet but Innerloop swears this is what they look like.

But physics are the most important element of getting the flight models right. All the fighters—and helicopters, civilian planes, etc.—use the same realistic physics-system and they all have different flight models. No cheating! And your wingmen use the same flight-model you use when you're all piloting an X-32.

***boot* What's new in JSF's terrain generator?**

Rokling The terrain-engine—IFS, Iterated Function Systems—is a clever way of storing extremely huge terrains in very little space. It reduces the number of polygons of the terrain in the distance, while keeping the texture and elevation detail at the same high quality. We've created an in-house tool allowing us to take real-world elevation data and texture maps, and generate the math data for displaying all of this real-time. When rendered, it uses normal polygons for the mesh.

***boot* How many polygons will the standard terrain map have?**

Rokling Each terrain map has 1.125 billion billion polygons. I think it's going to be a while before someone matches that.

Each campaign is made up of 2.4 million square miles of real-world terrain. The elevation in each campaign has been taken from satellite images, with elevation correct down to a grid of 100x100 meters. In between the elevation grid, we fill in the most plausible elevation pattern through complex algorithms to make it seem real, and according to a lot of enthusiastic beta-testers, it looks very realistic.

***boot* What's the minimum fps for JSF?**

Rokling This is very hard to answer, as the performance varies a lot with the hardware. On a P-Pro 200 with 16MB of RAM and an S3 Trio64, no hardware-acceleration, at 512x384 in 16-bit color, it runs at about 24fps when you're flying at 10,000 feet. Closer to the ground, it's about 20fps.

In *JSF*, both the physics algorithms and the AI take up a lot of processing. This slows everything down with maybe 50 fighters in the air all over the large terrain. However, trying to run it in the Dogfight mode, you'll gain approximately 5fps, regardless.

***boot* Are you using 3D acceleration? MMX? AGP? Force Feedback?**

Rokling *JSF* supports 3Dfx cards and Force Feedback through DirectX 5.0 drivers. It's not optimized especially for MMX.

***boot* How much freedom is there to fly around the map?**

Rokling Basically you can fly wherever you want, with fuel being the only limiting factor. This means you are free to roam each campaign territory, check out the various cities and sights, and get an overall feeling. The planes are stealthy so the chances of being detected are pretty slim.

product info

Available ***January 98***
Price ***TBA***
Developer ***Innerloop Studios***
Publisher ***Eidos Interactive***
Phone ***415.616.2022***
URL ***www.eidosinteractive.com***

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50 MIPS Digital Signal Processor: Dream™
Audio Codec: ESS Audiodrive 1868 and Dream™

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CD/Aux (stereo)
Stereo digital in (S/P DIF - 44.1 KHz)
RCA gold-plated stereo analog in

OUTPUTS

4-speaker output (1 main stereo and 1 stereo surround)
Stereo digital out (S/P DIF - 44.1 KHz)
RCA gold-plated stereo analog out
Line out

DRIVERS/API SUPPORT

DOS, Windows® 3.1, Windows® 95
DirectSound™ with hardware acceleration
Maxi™ Sound Dynamic 3D Audio

SUPPORT STANDARDS

General MIDI™
General Standard™
Sound Blaster™ and Sound Blaster Pro™
Roland MPU-401™ Mode UART
DLS™, Intel®, Cyrix®

SYSTEM REQUIREMENTS

486DX 66MHz or higher (Pentium® recommended)
3.5MB per second hard disk transfer rate
16-bit ISA slot, 8MB RAM, CD-ROM Drive
Windows® 3.1 or Windows® 95

GAME THEATER 64™

MSRP $199

HARDWARE ARCHITECTURE

50 MIPS Digital Signal Processor: Dream™
Audio Codec: ESS Audiodrive 1868 and Dream™

SYNTHESIZER

64-voice polyphony (expandable to 96)
Wavetable synthesis
16 MIDI channels

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SYSTEM REQUIREMENTS

486DX 66MHz or higher (Pentium® recommended)
16-bit ISA slot
4MB RAM (8MB required for Windows® 95)
Windows® 3.1 or Windows® 95

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APIS support

3D FEATURES

Perspective correct texture mapping
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MIP mapping
Sub-pixel correction
Polygonal-based Gouraud shading
Z-Buffering
Anti-aliasing
Alpha blending

SPECIAL EFFECTS

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Texture morphing, compositing, and animation

PERFORMANCE

45 Mpixels/sec sustained fill rate
1 million triangles/sec polygon
Simultaneously runs color fill, texture and polygon display

COMPATIBILITY

PCI bus 2.1 compliant
Most 3D APIS
Operates alongside SVGA and Windows accelerators

SYSTEM REQUIREMENTS

Pentium® 90 or higher
8 MB RAM
Available PCI slot
SVGA graphics card
CD-ROM or DVD-ROM drive
Compatible SVGA monitor
Windows® 95

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Product Information Number 156

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Cover photo by Stevan Nordström.

bootLab **Policy**

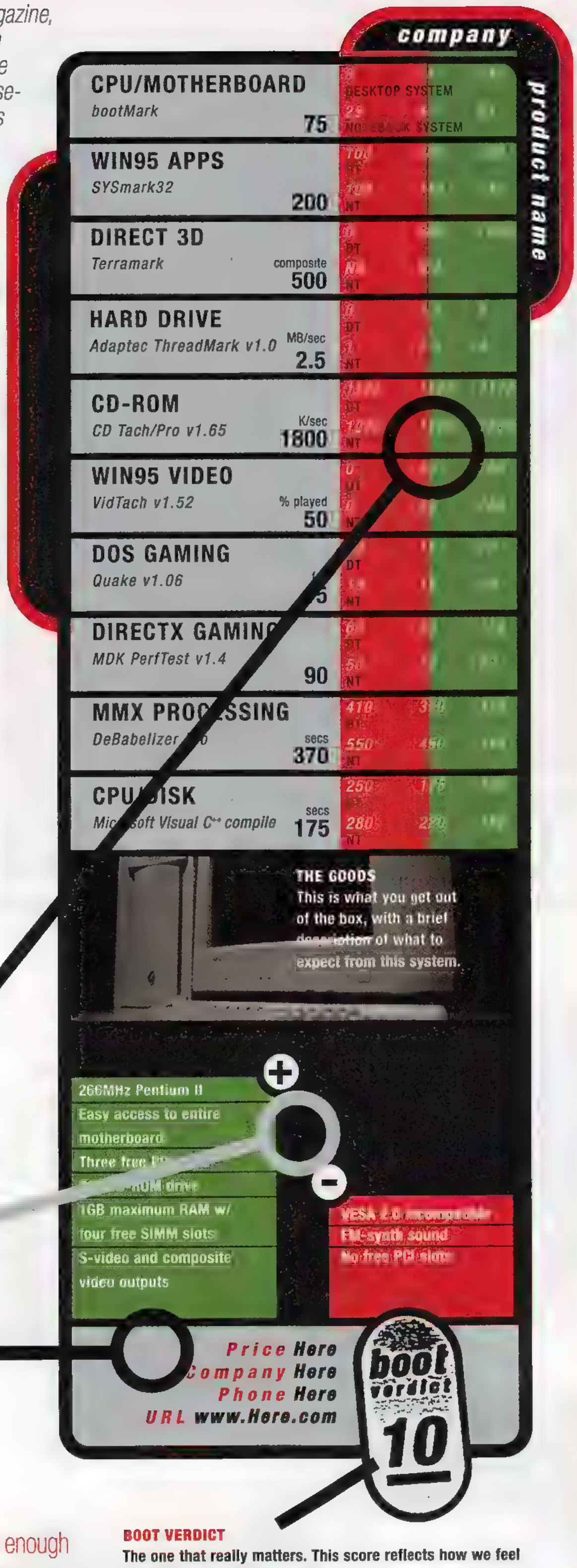
boot *isn't like any other computer magazine, and neither is our product-**evaluation** process. We don't test equipment in the cold, sterile environment of a warehouse-size lab, and we don't write our reviews based on the **test scores** that labcoat-wearing technicians scribble on clipboards.*

*Our review **scores** are based on a combination of objective **benchmark** testing, real-world performance, and our subjective evaluation of features, performance, and the many less tangible **characteristics** that go into a product. All of our evaluations are based on **hands-on** use of the product.*

New Benchmarks:

Final Reality and X

This month, we're adding two new tests to our 3D benchmarking bag of tricks. X is an upcoming Direct3D space combat and trading game from EgoSoft. The demo runs through a scripted series of scenes, and reports an average frame rate. Final Reality, a comprehensive 2D/3D benchmark developed by VNU European Labs, is based around a game engine from Remedy Entertainment's upcoming Max Payne. It tests several flythrough scenes, as well as some abstract performance tests. We expect it to become an industry standard in 3D performance testing. Look for both new tests to come bundled on the bootDisc beginning next month.


company
product name
CPU/MOTHERBOARD
bootMark
75
DESKTOP SYSTEM
NOTEBOOK SYSTEM
WIN95 APPS
SYSmark32
200
DIRECT 3D
Terramark
composite
500
HARD DRIVE
Adaptec ThreadMark v1.0
MB/sec
2.5
CD-ROM
CD Tach/Pro v1.65
K/sec
1800
WIN95 VIDEO
VidTach v1.52
% played
50
DOS GAMING
Quake v1.06
DIRECTX GAMING
MDK PerfTest v1.4
90
MMX PROCESSING
DeBabelizer
secs
370
410
550
450
CPU/DISK
Microsoft Visual C++ compile
secs
175
250
280
DT
NT
266MHz Pentium II
Easy access to entire motherboard
Three free
ROM drive
1GB maximum RAM w/ four free SIMM slots
S-video and composite video outputs
VESA 2.0 incompatible
FM-synth sound
No free PCI slots
Price Here
Company Here
Phone Here
URL www.Here.com
boot verdict
10

THE GOODS
This is what you get out of the box, with a brief description of what to expect from this system.

REAL-WORLD BENCHMARKING
The new meter has the precise scores for each category benchmarked. Plus, the color bars to the right give you a quick idea of how well the system performed in that category.

It's simple: The farther right the bar reaches, the better the system scored. Green means the system performed on par or beyond what we expect of a current system. If you see nothing but red, the system performed below expectations.

PLUSES AND MINUSES
Here's where we list the best and worst a system has to offer.

CONTACTS
Look here for price, and the company's phone number and URL if you want more information.

boot KICK ASS! PRODUCT

Only the **best** earn enough respect to be worthy of our **editors'-choice** award.

BOOT VERDICT
The one that really matters. This score reflects how we feel about a system, taking into account the benchmark results, quality of parts, usability, overall performance, and our intense, under-the-hood scrutiny.

KICKIN' THE TIRES ON THE LATEST **HARDWARE** AND TAKIN' THE NEWEST **SOFTWARE** OUT FOR A SPIN

***Hewlett-Packard* *Pavillion 8190* pg 130**

HARDWARE

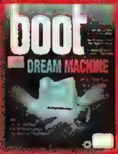
Dell Dimension XPS D300 . . . . . **98**
STB Velocity 128 . . . . . **104**
Diamond Viper 330 . . . . . **104**
ATI Xpert@Play **107**
Matrox m3D **108**
Audiotrix 3D-XG **109**
Jazz Adrenaline Rush **114**
Integraph Intense 3D Voodoo **114**
Canopus Pure 3D **114**
SuperMicro Super P5MMA98 . . . . . **117**
M-Tech MIG-R539 . . . . . **117**
Tekram P5T30-WS **117**
Umax UmaxStation 6400 . . . . . **122**
Packard Bell Multimedia S615 . . . . . **126**
Sigma Designs REALmagic Hollywoood **128**
JTS C3000-3AF **129**
Micropolis Mustang 4550A **129**
Fujitsu MPA3052A5 . . . . . **129**
Hewlett-Packard Pavillion 8190 . . . . . **130**
Compaq Presario 1680 . . . . . **134**
Toshiba Portégé 300CT **138**

***Matrox m3D* pg 108**

SOFTWARE

Jedi Knight: Dark Forces II **100**
Starfleet Academy **105**
Terricide **108**
Hexen II **110**
Need for Speed 2 Special Edition **112**
Pro Pinball: Timeshock! **112**
Age of Empires **113**
Dark Earth **118**
Lands of Lore: Guardians of Destiny **118**
Flight Simulator 98 . . . . . **119**
Shadows Of The Empire **128**

BACKISSUES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AUG/SEPT 96
DREAM MACHINE

VOL. 1, NO. 2
OCT 96
MAKE MULTIMEDIA

VOL. 1, NO. 3
NOV 96
DVD PREVIEW

VOL. 1, NO. 4
DEC 96
'96 LUST LIST

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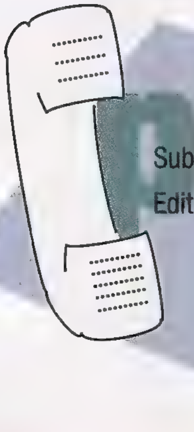

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Dell **Dimension** XPS D300

Burning up and breaking records

AGP and the fastest Pentium II CPU come together in Dell's Dimension XPS D300, a system that sets new standards in what to expect from any machine claiming Pure PC Power.

Using a design similar to Micron's towers, Dell takes a simple one-thumbscrew-and-slide approach to opening its plain-Jane medium case. Once inside, get ready for some hi-octane heat, thanks to the 300MHz P-II and its freakishly massive gold-anodized heatsink. Cooling off this bad mamma-jamma is a dedicated fan mounted below the ATX power supply. But, in a weird twist of un-ATXness, the power supply's fan isn't directed toward the CPU!

With a Dell-optimized Intel 440LX core-logic set, this motherboard sports three DIMM sockets, and one AGP, three PCI, one ISA, and one shared PCI/ISA slot. Taking up the ISA slots are Creative Lab's AWE64 Value Edition and USRobotics Sportster 56000 fax/voice/modem. That sexy little AGP slot is spoken for by STB's 4MB Velocity 128. Based on nVidia's Riva 128 3D accelerator (see the full review of its PCI counterpart on page 104), this card is a D3D favorite among many OEMs, as is ATI's 3D Rage Pro chipset.

Toshiba's XM-6102B EIDE CD-ROM drive sits in one 5.25" bay, while IBM's 8.4GB Deskstar 8 UltraATA/33 EIDE hard drive takes up a 3.5" internal bay, leaving one 5.25" and three 3.5" drive bays free. The XPS D300's top-of-the-line status would almost guarantee DVD as part of its repertoire, but alas, Dell decided to abstain. Visuals are handled by Dell's 1200HS 17" monitor, while Altec Lansing's ACS-490 handles the sonics.

On the performance tip, this thing almost broke our benchmarks. While the 140.6 on our bootMark comes as no surprise to anyone familiar with *boot*'s own Dream Machine 97, the massive 300 on the SYSmark32/Win95 performance benchmark crashes past anything we've seen to date! Under the AGP-enhanced STB Velocity 128, the video subsystem burns serious silicon, with Direct3D, DirectDraw, and DOS-gaming via *Quake* breaking all current records. *Quake*'s 31.2fps, in particular, is very impressive (and that's unaccelerated, folks—GL drivers are forthcoming). *Terracide*'s frame rates locked in with the monitor's maximum refresh rate—a solid 85fps. *Debab* scores and C++ compiles also zipped along nicely. The only slight glitch was the Video For Windows-specific video benchmark, but ActiveMovie and MPEG-1 playback dropped zero frames—even at 1280x1024! IBM's Deskstar 8 is one mean hard drive, posting fat transfer rates normally associated with SCSI drives, and Toshiba's CD-ROM drive ran quite speedily.

Is anything really wrong with this machine? Well, Dell chose to give this box only one serial port. Also, the Altec ACS-490 is a decent subwoofer/satellite combo but not as compelling as the ACS-48 or even the tiny-terror ACS-45. Immature STB Velocity 128 video drivers, however, were what really robbed the XPS D300 from Kick-Ass status. We encountered glitches galore with many D3D games, from *Incoming*'s psychedelically wrong palettes to *Moto Racer*'s occasional texture smear. Even *Jedi Knight* dissolved into an unplayable goo. Downgrading to an older driver fixed the *JK* problem, but the other flaws persisted, despite blinding fast framerates. And with the new drivers, the SYSmark32 benchmark bombed out.

If you're willing to forgive its tiny transgressions, the Dell Dimension XPS D300 is one mighty multimedia powerhouse. But immature video drivers keep this speedaholic from becoming a Kick-Ass system.

—Andrew Sanchez

under the hood

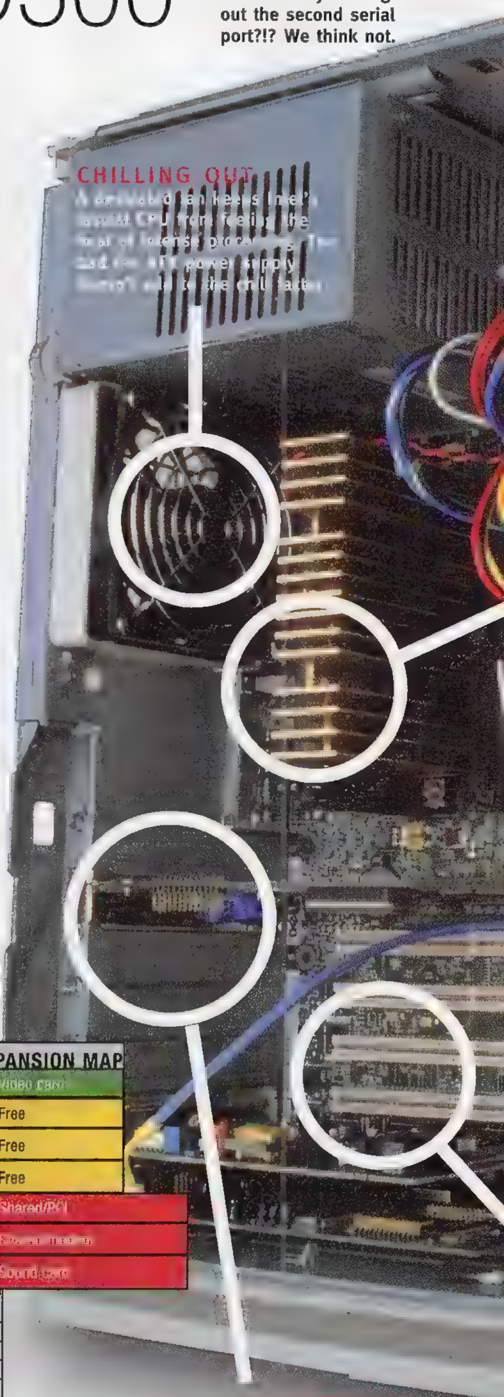
THE BRAINS	
CPU	Intel Pentium II 300MHz
L2 CACHE	512K ECC-BSRAM (internal)
RAM	64MB SDRAM (384MB max)
Motherboard	Intel AL440LX Atlanta ATX form-factor (with Dell modifications)
THE BRAWN	
Video	STB Velocity 128 AGP (nVidia RIVA 128) with 4MB of SGRAM
Hard Drive	IBM Deskstar 8 DHEA 38451 8.4GB UltraATA/33 EIDE
CD-ROM	Toshiba XM-6102B EIDE
Expansion Bus	One AGP, three PCI, one ISA, one PCI/ISA shared
Fax/Modem	USRobotics Sportster 56000 x2 voice/fax/modem
LAN	None
I/O Ports	Two USB, one serial, one parallel
THE BEAUTY	
Display	Dell 1200HS 17-inch Trinitron
Sound	Creative Labs AWE64 Value Edition
Speakers	Altec Lansing ACS-490 three piece subwoofer/satellite
Other	Microsoft Intellimouse (with wheel)

THE BUNDLE Microsoft Windows 95 OSR2 I Microsoft Office 97 Small Business Edition I Microsoft Encarta 97

boot :55 *down* :03

EXPANSION MAP

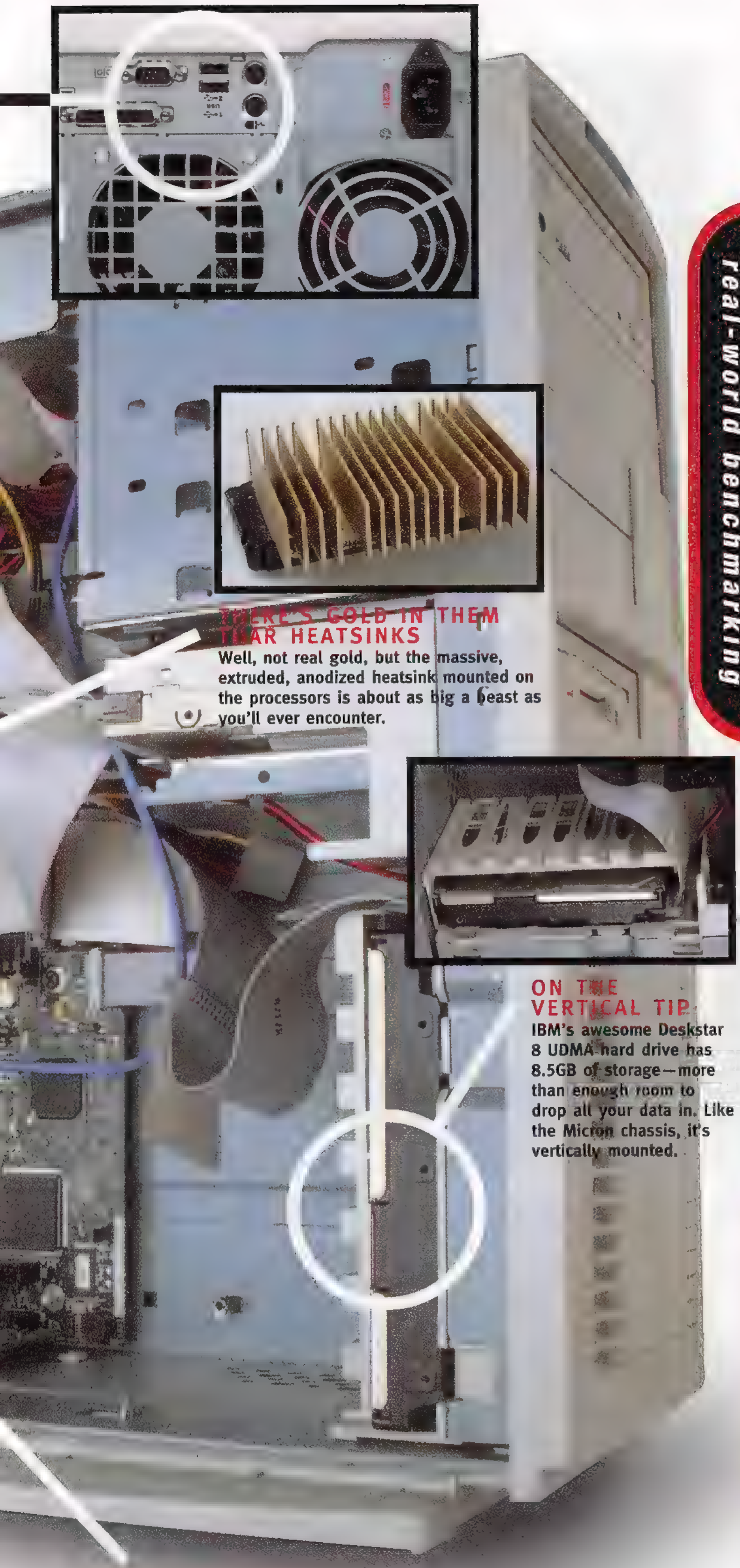
AGP	Video card
PCI	Free
PCI	Free
PCI	Free
ISA	Shared/PCI
ISA	[illegible]
ISA	Soundcard



NO SECOND SERIAL PORT FOR YOU
We don't know what they're thinking, but did it really save that much money leaving out the second serial port?!? We think not.

CHILLING OUT
A dedicated fan keeps Intel's [illegible] CPU from feeling the heat of intense processing. The [illegible] ATX power supply doesn't add to the chill factor.

D3D SPEED DEMON
For the complete 411 on STB's Velocity 128, take a peek at the full-fledged review in this issue. This card, when combined with a 300MHz P-II, is one intense D3D platform that'll keep framerates pinned well past 24fps.



THERE'S GOLD IN THEM THAR HEATSINKS
Well, not real gold, but the massive, extruded, anodized heatsink mounted on the processors is about as big a beast as you'll ever encounter.

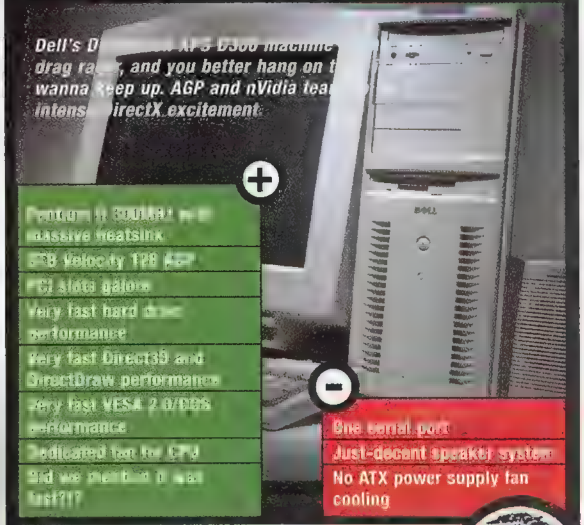
ON THE VERTICAL TIP
IBM's awesome Deskstar 8 UDMA hard drive has 8.5GB of storage—more than enough room to drop all your data in. Like the Micron chassis, it's vertically mounted.

THEY'RE FREE, TO DO WHATEVER THEY WANT
With video relegated to the dedicated AGP bus, you get four free PCI slots awaiting your filling pleasure. Even though the shared slot is taken on the ISA side, we know you can squeeze a PowerVR card in there if you really wanted to.

Dell
Dimension XPS D300

real-world benchmarking

CPU/MOTHERBOARD	*bootMark*		140.6	
WIN95 APPS	*SYSmark32*		300	
DIRECT3D	*Terramark*	composite	1430	+
HARD DRIVE	*Adaptec ThreadMark v1.0*	MB/sec	5.46	+
CD-ROM	*CD Tach/Pro v1.65*	K/sec	2333	+
WIN95 VIDEO	*VidTach v1.52*	% played	26.8	
DOS GAMING	*Quake v1.06*	fps	31.2	+
DIRECTX GAMING	*MDK PerfTest v1.4*		127	+
MMX PROCESSING	*DeBabelizer Pro*	secs	203	+
CPU/DISK	*Microsoft Visual C⁺⁺ compile*	secs	88	+



Dell's D [illegible] XPS D300 machine [illegible] drag ra[illegible], and you better hang on t[illegible] wanna keep up. AGP and nVidia tea[illegible] intens[illegible] irectX excitement.

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- STB Velocity 128 AGP
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- Very fast VESA 2.0/DOS performance
- Dedicated fan for CPU
- Did we mention it was fast???

−
- One serial port
- Just-decent speaker system
- No ATX power supply fan cooling

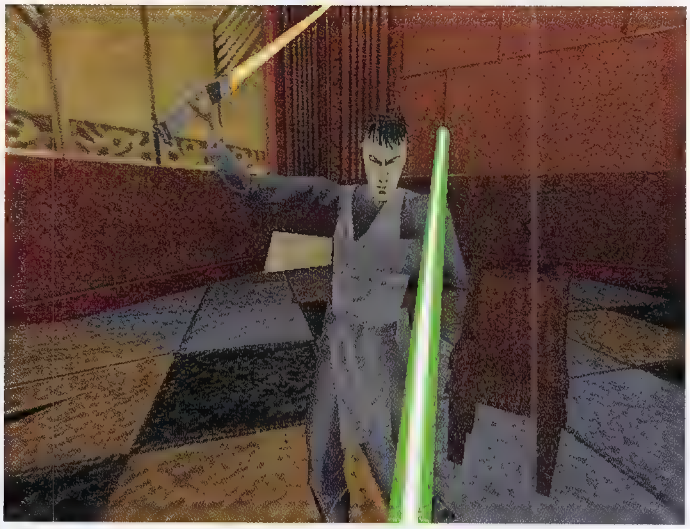
Price $3,699
Company Dell
Phone 800.999.3355
URL www.dell.com

boot verdict 9

A complete breakdown of benchmark results is available on the *bootNet*. Point your browser to www.bootnet.com

Jedi Knight: Dark Forces II

The force is strong with this one



With a lightsaber in hand, it's time to kick ass and take names in Jedi Knight.

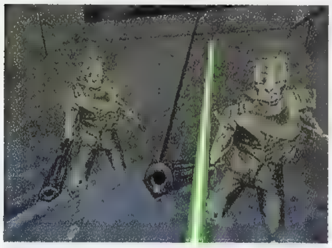
CHECKLIST

Maximum Resolution/Color
1280x1024/16-bit
Win95 Native
3D Hardware Acceleration
Direct 3D
3D Sound
DirectSound
DirectX
DirectDraw DirectSound
DirectPlay
Multiplayer
Modem Direct/serial
IPX Internet
MS Internet Gaming Zone

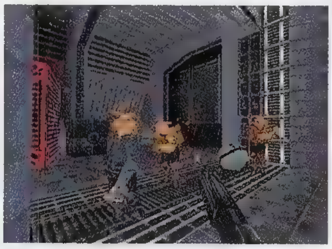
Dust off your blaster and shine that lightsaber, 'cause the Force is calling you back to active duty in *Jedi Knight: Dark Forces II*, a first-person shooter that breaks the boundaries of mindless fragging, and immerses you in the *Star Wars* universe.

You are Kyle Katarn, a free-wheeling mercenary charged with stopping Jerec and his band of Dark Jedi from discovering the Valley of the Jedi. During your quest, you discover your Jedi destiny, and learn to wield its many powers. And depending on whether you side with the Light side or succumb to the Dark side, the Force empowers you in different ways.

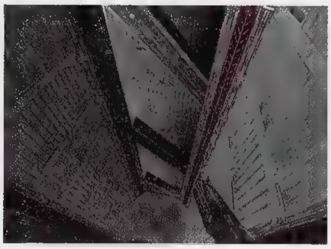
LucasArts has scrapped the decrepit ray-cast engine last seen powering the abysmal *Outlaws* (reviewed in *boot* 11), and has built a sector-based, 3D-polygon engine from scratch. Capable of on-the-fly level-of-detail adjustment and rendering anywhere from 4,500 to 10,000 polygons per scene, the software renderer delivers decent framerates, but Direct 3D acceleration launches *Jedi Knight*'s framerates into hyperspace: beyond 24fps at 800x600/16-bit color. With enough RAM on your vidcard, even higher resolutions are possible: 1024x768/16-bit on an 8MB Permedia 2 board (something *Quake* can't do). But this DX5 game requires the absolute latest video drivers, and depending on your accelerator, you may or may not get all the special effects—and there's a lot of 'em, including semi-transparent water and shields, and underwater warping effects.



Ranging from 150 to 300 polygons each, these foes are no match for a mercenary-turned-Jedi.



Some confrontations are best resolved with a laser blast—and this one's no exception.



Each Jedi Knight level will immerse you in vast spires and twisting catacombs.

The level design in *Jedi Knight* is vast and wondrous—tip-toeing across a catwalk in Nar Shaddaa induces vertigo rarely felt in a game. The RenderDroid/SITH gaming engine can simulate hilly outdoor environments, vast spires, and claustrophobic hallways with equal aplomb, so you aren't relegated to wandering corridors of 32x32 texture maps.

The Smacker-compressed SVGA cinematics are near movie-quality, despite the occasionally out-of-sync audio and the evil hokiness of Jerec, whose inelegant facial tattoos look more like he broke a pen in his mouth.

Lucas' design team learned much from id's masterpiece, and incorporated wealth options such as a non-intrusive console, the ability to toggle your preferred means of picking up weapons, and a default keyboard layout catering to the keyboard/mouse combo. Jedi-on-Jedi violence is dealt via a character creation system that's designed to keep high-powered Jedi Knights from beating down lowly acolytes.

The game supports a Corellian Frigate full of resolution options. Depending on your video chipset and the amount of local video memory, your maximum playable resolution will be different. Through casual testing we found a gamut ranging from 1600x1000 via DirectDraw on an 8MB ATI 3D Rage Pro, to 640x480 via Direct3D on a 4MB 3Dfx Voodoo. Of course, framerates at different maximum resolutions are different stories altogether.

Jedi Knight is far from perfect. There's clipping problems galore, resulting in lightsabers and limbs disappearing into supposedly solid objects. Weird collision detection has AT-AT walkers floating in air, and Gamorrean guards casually standing with one foot off a ledge. Also, repetitious speech and key-framed death animations—one unique death throe per species—grow increasingly grating. Lighting effects are tastefully minimal, as is the use of colored lighting. And the lightsabers could use a shiny coat of alpha transparencies around the edges for that wholesome glow you've grown to love in the movies.

The biggest disappointment is lightsaber combat. Its poetry is reduced to mindless horizontal and vertical hacks akin to *Daggerfall*. LucasArts should have taken a close look at Namco's *Soul Edge* or Square's *Bushido Blade* for lessons on designing a weapons-based combat system filled with an intricate attack and blocking system. There's no locking of sabers in *Jedi Knight*, and auto-blocking only cheapens the intensity of close-quarter combat.

The promise of wielding the Force is too good to pass up, and despite all the blemishes, *Jedi Knight*'s intense level design and solid single-player action will have you quickly flowin' with the Force. You may proceed, Admiral.

—Andrew Sanchez

Price $50
Developer/ Publisher LucasArts
Phone 888.532.4263
URL www.lucasarts.com

boot verdict 9

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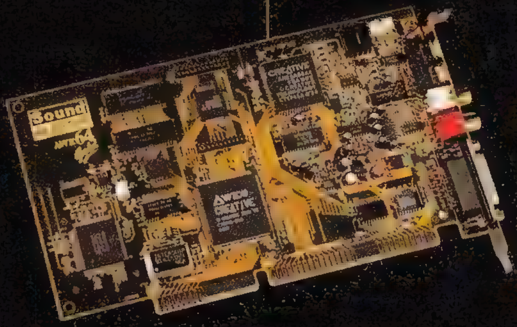

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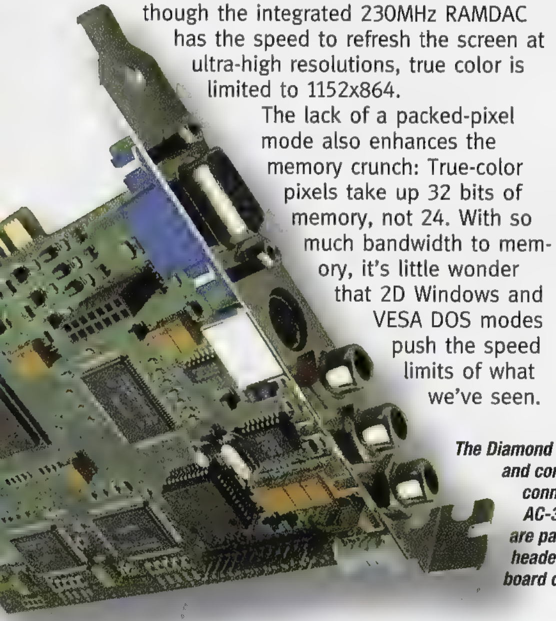
STB **Velocity 128** and **Diamond Viper** 330

Don't believe the hype

The nVidia Riva 128 chip powering the STB Velocity 128 and Diamond Viper V330 is good, but from listening to the early responses, you'd think it was the Second Coming done in polygons. Look beyond the great numbers it posts, and there are more than a few blemishes on these benchmark-devouring beasts.

The Riva 128's 2D and 3D speed is due to an incredibly fast memory interface, connecting 4MB of 100MHz SGRAM over a 128-bit bus. Theoretically, this allows the Riva to suck data at twice the rate of 64-bit chips. But then comes the first lurking flaw: 4MB is all you get—ever. Even though the integrated 230MHz RAMDAC has the speed to refresh the screen at ultra-high resolutions, true color is limited to 1152x864.

The lack of a packed-pixel mode also enhances the memory crunch: True-color pixels take up 32 bits of memory, not 24. With so much bandwidth to memory, it's little wonder that 2D Windows and VESA DOS modes push the speed limits of what we've seen.

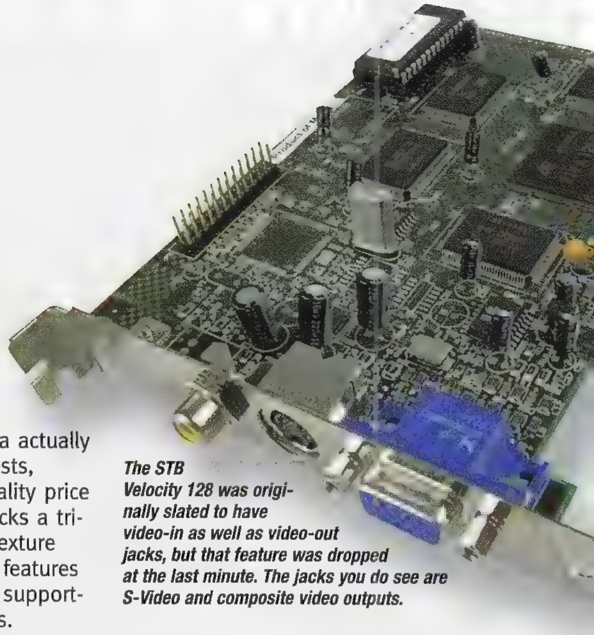


The Diamond Viper V330 also has S-Video and composite-out jacks. The other connectors you see are for digital AC-3 audio-out and video-in, and are passed through to an internal header where a multimedia add-on board could be added in the future.

And both these boards support not just VESA 2.0, but are the first we've seen with VESA 3.0 in the BIOS. 3D performance is on-par with the standard-setting 3Dfx Voodoo, and the Riva actually crawls ahead in some Direct3D tests, though there is a slight visual-quality price to pay (see sidebar). The Riva packs a triangle setup engine and on-chip texture cache, and can handle all the 3D features asked of it, except the still rarely supported trilinear filtering and fog tables.

On a Micron Mxe 200MHz MMX with 32MB of RAM, both boards scored a 92 on the *MDK* PerfTest, 17.5fps on *Quake* at 640x480, 12.3fps on *Quake* at 800x600, and 2.45 R-Marks on the overall *Final Reality* benchmark (a new addition to the *boot* testing stable). Neither card ran *glQuake* (no Win95 GL Drivers), and while the Diamond scored an overall 893 on the TerraMark, the STB couldn't run the test.

Both boards sport TV-out jacks, though they prove more trouble than they're worth. The monitor and TV outputs cannot be active simultaneously, so you're always staring at one or more blank screens. If you want to boot up in TV mode, you have to crawl behind your machine and unplug the monitor. And if you leave TV-out enabled in the control panel, a game switching into 640x480 resolution might suddenly leave your monitor blank as the TV-out kicks in, even if the TV is no longer hooked up. This behavior is totally unacceptable, and the end result is that the TV-out features are next to useless. Picture quality over the S-Video jacks is fair, but the control panels don't provide even a fraction of the tweaks to adjust your TV picture that ATI allows. At least the on-screen video-in-a-window quality is better than average, though full screen windows at high resolutions are often choppy and dithered.



The STB Velocity 128 was originally slated to have video-in as well as video-out jacks, but that feature was dropped at the last minute. The jacks you do see are S-Video and composite video outputs.

Currently, the Viper and the Velocity are so similar, they can even run each other's drivers. They share the Riva's strengths—and its weaknesses. Performance is similar between the two, and the only place where significant differences appear is in the display utilities and software bundle. If all you're looking for is fast Direct3D gaming, and don't care about TV-out, these boards are very good at the things they do well. Just don't expect any more from them.

—Chris Dunphy

Optimized For Annoyance

There's no denying that the Riva 128 chip is fast, particularly at running benchmarks. But the tricks being pulled behind the scenes to achieve such speeds are disturbing. First, the Riva drivers automatically generate lower-res MIP maps for games that don't already have them. This lets the boards keep more low-resolution textures in local memory, avoiding the speed hit of turning to the PCI or AGP bus to reload the original larger ones. And nVidia admits its algorithms do a less-than-stellar job of shrinking the textures and then displaying a low-res MIP map when a higher-res would have been better. Choosing MIP maps should be left to the game programmers, and generating them should be left up the artists—not the driver software. This "optimization" distorts benchmarks that force a chip to use the AGP bus: The benchmark may think that local memory is full and AGP memory is being used, when in reality the Riva chip is actually using lower-esolution MIP maps out of local memory. It's not quite cheating, but it is a little fishy. The other Riva optimization that negatively affects visual quality is that the chip requires all textures to be perfectly square. Rectangular textures are stretched to fill a square area of memory at load time, resulting in noticeable distortion. nVidia promises the next generation of Riva will be able to handle textures of any dimensions.

Product Diamond Viper
Price $199
Company Diamond Multimedia
Phone 800.468.5846
URL www.diamondmm.com
Bundle F22, Moto Racer, MDK: Mission Laguna Beach, Web 3D, PhotoSuiteSE, VRCreator/Learning Edition, WIRL

boot verdict 8

Product Velocity 128
Price $199
Company STB
Phone 800.234.8750
URL www.stb.com
Bundle Interstate '76, FIFA Soccer '97, Moto Racer, Simply 3D (limited edition), WIRL, VRCreator

boot verdict 8

Starfleet **Academy**

Drifting on impulse power

Despite promises to explore the entire *Trek* universe, *Star Trek: Starfleet Academy* never hits warp speed, coming off instead as a *Wing Commander* clone.

The premise seems a lock: You're an ace cadet at the Academy, facing a series of loosely linked simulator missions in command of various Federation craft against familiar foes such as the Romulans and the Klingons.

Piloting Constitution-class starships feels like maneuvering a TIE Fighter. And that's just wrong.

At first, missions seem interesting enough. In best *Trek* tradition, they often emphasize diplomacy over gunnery, and may even call for you to ignore stated orders and objectives. Unfortunately, while missions seem to twist and turn, there's really only one right way to complete them. You end up mindlessly repeating pre-ordained actions until you get them exactly right. There's little branching in the overall storyline, so the results of one mission generally don't affect subsequent scenarios.

Missions are pasted together by FMV cut-scenes, with acting that falls short of even *Star Trek: Klingon*. The plot is downright limp, and cut-scene characters confusingly treat "simulator" events as though they were a part of the wider *Trek* reality.

CHECKLIST

Maximum Resolution/Color
640x480

Win95 Native

3D Software Acceleration
Direct3D

3D Sound
Dolby Surround

DirectX
DirectDraw DirectSound
DirectPlay DirectInput

Multiplayer
LAN Modem Direct/serial

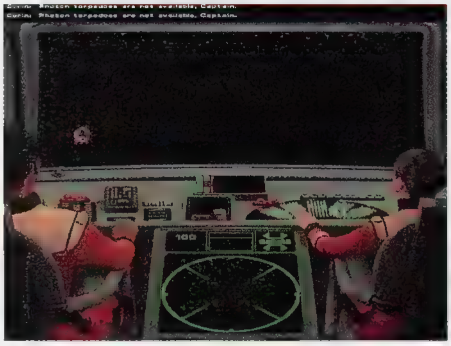
MMX Enhanced

Multiple CDs

Worst of all, the ships don't act the way you'd expect them to. It's just not right that a Constitution-class starship should corner like a TIE fighter. There's some inertia lag on acceleration, but never any *feel* of captaining a massive space cruiser. Assemble several of these underweight ships, and battle engagements end up more like arcade-game dogfights than *Star Trek*'s grandiose Nelson-at-Trafalgar naval battles. Attempts at cat-and-mouse duels, a la *Wrath of Kahn*, are scuttled by moronic computer AI and the lack of realistic complexity in sensor and navigation systems.

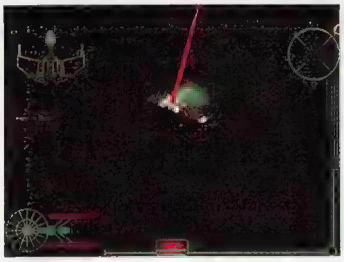
While you're joysticking your battle-cruiser around by the seat of your pants, you might occasionally need to fire up the sensors or nav computers. But with missions stuck on rails, most of the switches feel like they're just painted on. Hailing other ships or doing a sensor scan only provides a worthwhile response when there's one called for in the script. What's really bad about the entire simulation is that despite the fact that you're supposed to be a commander in training, you wind up flying the starship yourself, and literally jumping from station to station working all those switches. It seems you're the captain of a ship of fools.

On the plus side, the 640x480 SVGA graphics are fairly crisp, with polygon ships about as detailed as they were in the original TV show. Adding 3D acceleration via Direct3D smoothes ship surfaces, but actually seems to lose a bit of the texture detail. Either way, frame rates cruise in the 20+fps range on a P166. In-depth space battles barrage your monitor with a slew of visual effects, like transparency effects with cloaking vessels, lens-flares, and phaser fire glancing off semi-transparent shielding effects. Even then, the overall experience of traipsing through space is a bland affair—not even the almighty Federation star bases seem gargantuan, as they do in the movies. Your combat view can change from full screen to a windowed affair, with superimposed bitmapped cadets manning the helm. Too bad they don't react with the on-screen action.

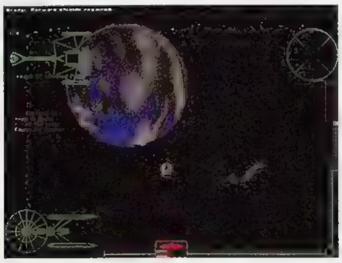


Curin: Photon torpedoes are not available, Captain.

Starfleet Academy's *Captain's seat view looks nice, but offers less information than full-screen.*



Red areas in the diagrams show specific battle damage.



At close range, both phasers and photon torpedoes target the enemy.

Romulans can only be targeted while uncloaked.

Sound effects are very authentic, probably digitized from the old TV show. And the Win95 implementation is laudably slick, even allowing Alt-Tabbing to other apps.

Fans of either the *Trek* series or the *Wing Commander* games will enjoy *Starfleet Academy* as a bit of light entertainment—as long as they don't expect to go where no game has gone before.

— Frank Lenk

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Developer/
Publisher *Interplay*
Phone *714.553.6655*
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boot verdict
6

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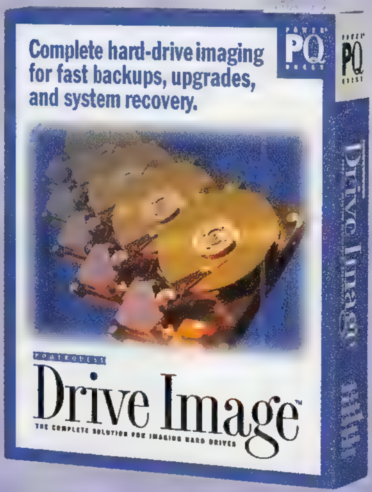
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Product Information Number 281

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ATI **Xpert**@Play

A Perfect Balance

A "perfect" graphics card doesn't skimp on 2D, 3D, or video. It balances speed, features, and quality, and does it all with style. Until now, this balance required installing more than one video card (as detailed in the *boot* 12 12-Step), or at the very least, a board with multiple graphics chipsets. The ATI Xpert@Play, however, comes darn close to pulling off the hat trick. If you can have only one graphics card in your system, and ever intend to do more than just play games, the Xpert@Play delivers the balance you crave.

The Xpert@Play comes with 4MB of 100MHz SGRAM and a 230MHz RAMDAC. With 4MB, it supports resolutions up to 1600x1200 at 85Hz in 16-bit color, and if you upgrade to 8MB you can even do 24-bit color at this insanely high resolution. This is the high-res territory few professional cards dare tread. Even more amazing is that the Xpert@Play supports full-screen video playback at this resolution—most boards' video acceleration cuts out at higher resolutions. Video quality is superb, and the video scaler supports source material at up to DVD resolution (720x480). The 3D Rage Pro chipset also supports motion compensation, allowing software DVD decoding on Pentium II-caliber machines.

The ImpactTV2 chip on-board provides excellent composite and S-Video output of all resolutions 800x600 and below, even including funky VESA and DirectX modes. If you want to play games on your big-screen TV, nothing equals ATI quality and convenience. A slew of control panel tweaks let you adjust the output to fit your TV perfectly. When TV out is active, your monitor is left running at only 60Hz, but at least it's not blanked.

Offering a full spectrum of 3D features and solid Direct3D drivers, the 3D abilities of the Xpert@Play are significantly enhanced over yesterday's crop of integrated 2D/3D accelerators—but the Rage Pro is no threat to the 3D-only Voodoo, which leads the pack. Some 3D features that aren't coming until DirectX 6.0 are supported, too, such as texture compression and compositing, helping to future-proof the chip. Missing, though, is an OpenGL driver for Win95, denying *Quake*-based games any acceleration.

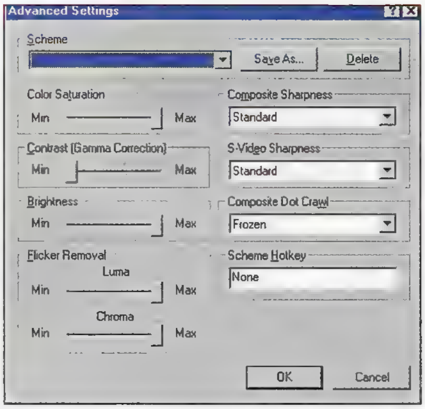
The Xpert@Play may not be the fastest vid card on the block, but it is fast. The Rage Pro has the features and performance to handle all of today's crop of 3D titles, and lacks any lurking flaws that will prevent it from running tomorrow's games. If you're only going to have one graphics chip in your system, the Xpert@Play's Rage Pro is currently your best choice. And until the All-in-Wonder Pro arrives, the Xpert@Play is the flagship of ATI's fleet.

—Chris Dunphy

The Specs

ATI Xpert@Play (8MB)	
Max 24-bit resolution/refresh	1600x1200/75Hz (8MB req.); 1280x1024/100Hz
Max 16-bit resolution/refresh	1600x1200/85Hz
VESA 2.0 Support	Yes
Virtual Desktop Support	Yes
MDK PerfTest	94
Quake 640x480	14.0fps
Quake 800x600	10.1fps
Final Reality Overall	2.28 R Marks
FR 3D	2.50 R Marks
FR Polygons	76.14 Kpoly/s
FR Fill	38.81 Mpixels/s
FR Robots	16.05fps
FR City	18.99fps
X Demo (800x600)	29.354fps
GLQuake	No Win95 GL Driver
TerraMarks (Level 1/2/3)	376/375/Failed

Test machine was a Micron Mxe 200MHz MMX with 32MB RAM.


Advanced Settings

Scheme

Color Saturation: Min — Max

Composite Sharpness: Standard

Contrast (Gamma Correction): Min — Max

S-Video Sharpness: Standard

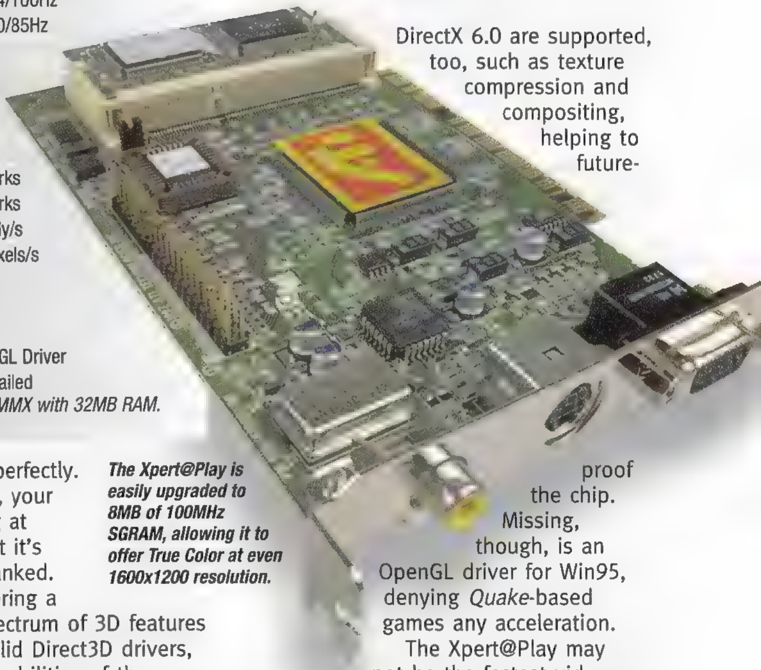
Brightness: Min — Max

Composite Dot Crawl: Frozen

Flicker Removal: Luma Min — Max; Chroma Min — Max

Scheme Hotkey: None

ATI's masterful set of display utilities includes control panels for adjusting just about everything, including a whole set of tweaks to help you get the best possible rendition of your computer's screen onto your TV. Both the TV-out port and the monitor can be active at the same time, too.



The Xpert@Play is easily upgraded to 8MB of 100MHz SGRAM, allowing it to offer True Color at even 1600x1200 resolution.

Jedi Knight ***played great on the Xpert@Play, even at 1024x768.***

All-in-Wonder Pro Coming; GLQuake AWOL

If you dig the idea of your computer doubling as your TV, you need an All-in-Wonder equipped with the Xpert@Play's faster Rage Pro chip. We're talking an All-in-Wonder Pro. It'll feature up to 8MB of SGRAM, video and cable TV-in, and video-outs. New features include an instant-replay window with a 10-second delay, and the ability to transcribe TV shows featuring thumbnail images as well as text.

If you don't feel like waiting, don't fret: Plug ATI's TV tuner board into an ISA slot next to your Xpert@Play, and you've got all the functionality of the All-In-Wonder Pro, once software becomes available on the web.

But don't bother waiting for ATI's OpenGL driver. ATI has bowed to pressure from Microsoft, becoming the only major 3D-chip maker accelerating OpenGL only under Windows NT. ATI is hoping Microsoft comes up with some sort of wrapper to allow Quake and its descendants to run on Direct3D, but until that day comes, buying ATI today means no accelerated Quake II for you.

BUNDLE: Formula 1, Terracide, WIRL

Price ***$329 (8MB)***
Company ***ATI***
Phone **905.882.2600**
URL ***www.atitech.com***

boot verdict 9

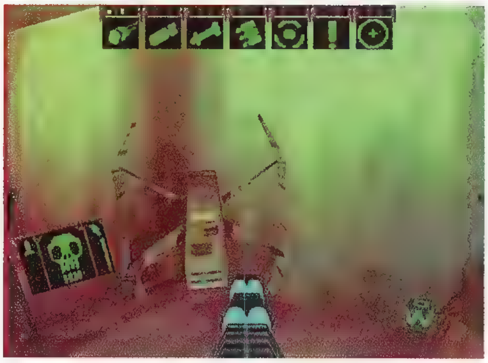
Terracide

Terracidal tendencies

TRY IT ON THE DISC

At it's best *Terracide* is a B-movie sequel that could be titled *Curse of the Son of Descent.* Right down to the robot opponents, twirling power-ups, and maze-like corridors, it looks just like the fast-paced, nausea-inducing shooter—except *Terracide* offers little more than 3D-accelerated scintillation slopped on top of an inept game.

What *Terracide* lacks in originality, it makes up for in graphical prowess. Even though there are minor clipping problems and seams sometimes spring up, overall graphics are top-notch. Double Bonus points for the inclusion of a slew of 3D drivers, including ones for 3Dfx, Power VR, and Rendition cards. The 640x480 3Dfx version is smooth and polished, bumping frame rates up to near 60fps. With more than two objects onscreen, frame rates drop to 30fps. Points, too, for IPX and TCP/IP network support for up to 16 players.


Terracide *suffers from a potent case of* **Descent** *Dejavu.*

All the ingredients of a stellar game are here, but they never quite congeal. Part of the problem is control. *Terracide* lacks the smooth control its big bad brother Descent enjoyed, jerking at the lightest touch of the joystick and sending your poor craft spinning through the hallways. Even with the "Realistic Inertia" option turned off, this poses a severe problem when several opponents attack from multiple directions.

When the visual bells and whistles wear thin, *Terracide* is just a clone standing alongside the other sub-par ripoffs.

—Dan Simpson

Price $40
Developer Sims
Publisher Eidos
Phone 415.616.2022
URL www.eidosinteractive.com

boot verdict 4

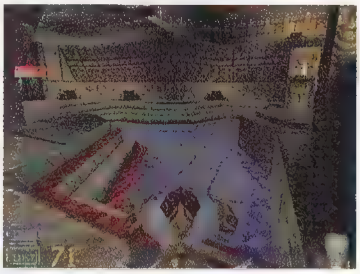
Matrox m3D

Little Quaker

Matrox deserves credit for finally admitting the Mystique isn't a viable 3D gaming card, and turning to another chipmaker. Its new m3D employs NEC's PowerVR chipset, and has the 3D-only power to turn a box stuck with a 2D-only card or anemic 2D/3D card into a passable gaming machine. And while the m3D is far from perfect, something must be said for a $100 card that takes *Quake* to resolutions that Voodoo can't achieve.

The impossibly tiny m3D is essentially the Apocalypse 3Dx (reviewed in *boot* 9) with new drivers. The card combines the PCX2 graphics chip with 4MB of SDRAM texture memory. There's no onboard frame buffer, nor are there messy patch cables. Output travels the PCI bus to your main graphics card, which then refreshes the display, allowing the m3D to accelerate both full screen games and 3D in a window.

The m3D is a budget-conscious *Quake*-head's dream come true. Not only does its *GLQuake* performance and visual quality rival Voodoo, the m3D also offers the high resolutions and 24-bit color that 3Dfx can only dream of. And sons of *Quake*, such as *Hexen II*, look just as gorgeous. id has promised PCX2 support in *Quake* II, but without support for several alpha-blending modes, *QII*'s multi-colored lighting effects won't work with the m3D.


Hexen 2 *looks fabulous accelerated on the m3D, and is almost playable at 1024x768. Be sure and try 24-bit color—it hardly slows the game down and gets rid of the dithering artifacts seen on 3D cards that can only do 16-bit.*

To avoid these problems, developers must keep PowerVR's odd architecture in mind, and in this Voodoo-obsessed age, few Direct3D titles do. D3D games offer only mediocre performance on the M3D, and visual glitches abound. PowerSGL titles, however, look straight out of the arcade (unfortunately, these native titles are few and far between).

Now that Sega and Matrox have thrown in with PowerVR, developers may not be able to ignore PCX2 optimizations much longer. In the meantime, the m3D remains a tolerable D3D card, provides a few stunning native titles, and is a good place to play *Quake*-engine games. For *Quake* alone, this board proves its worth, and comes bundled with *Ultim@teRace*, *Hexen II: Continent of Blackmarsh*, and demo versions of 15 other 3D games.

—Chris Dunphy

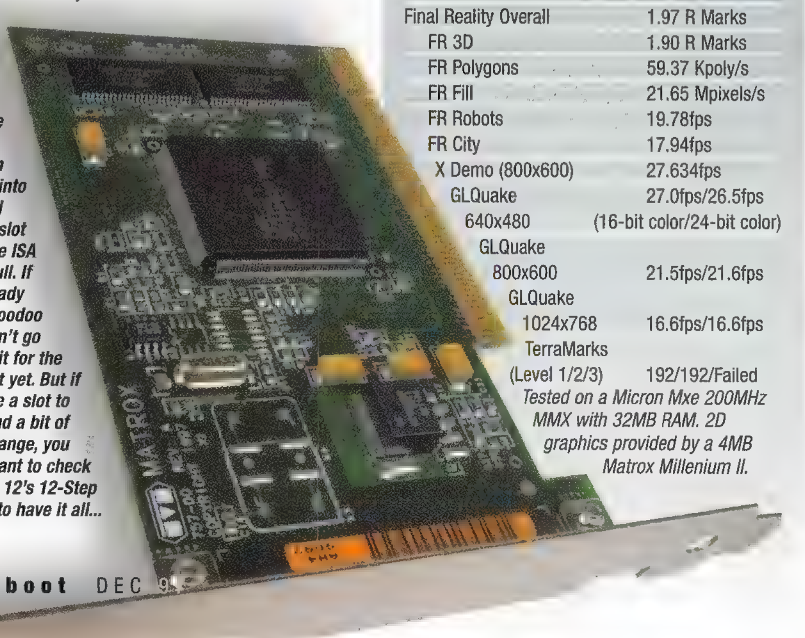
Price $99
Company Matrox
Phone 800.844.8302
URL www.matrox.com/mga

boot verdict 7

The Specs

	Matrox m3D
Final Reality Overall	1.97 R Marks
FR 3D	1.90 R Marks
FR Polygons	59.37 Kpoly/s
FR Fill	21.65 Mpixels/s
FR Robots	19.78fps
FR City	17.94fps
X Demo (800x600)	27.634fps
GLQuake 640x480	27.0fps/26.5fps (16-bit color/24-bit color)
GLQuake 800x600	21.5fps/21.6fps
GLQuake 1024x768	16.6fps/16.6fps
TerraMarks (Level 1/2/3)	192/192/Failed

Tested on a Micron Mxe 200MHz MMX with 32MB RAM. 2D graphics provided by a 4MB Matrox Millenium II.


Hardly bigger than a playing card, the Matrox m3D can even fit into a shared PCI/ISA slot when the ISA half is full. If you already own a Voodoo card, don't go junking it for the m3D just yet. But if you have a slot to spare and a bit of extra change, you might want to check out boot *12's 12-Step on how to have it all...*

Audiotrix 3D-XG

Wavetable versus FM Synth… Fight!

What are those two cards doing?!? Why, they're trying to make beautiful MIDI music together—and the Audiotrix 3D-XG does just that.

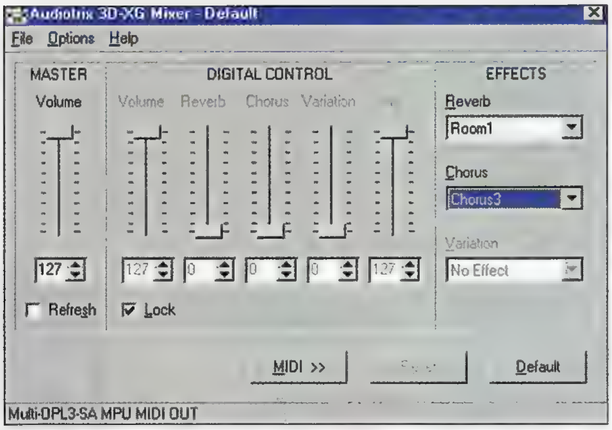
Ever since Roland stupidly retired its line of Sound Canvas GMIDI sound cards, everyone's laying claim to the "ultimate" prosumer sound card. The 3D-XG is no exception.

This two-card combo consists of the Audiotrix 3D, a 16-bit ISA Plug-and-Play-compliant device, and Yamaha's DB60XG wavetable daughterboard. Within the Audiotrix 3D, Yamaha's OPL3-SA3 multifunction 16-bit processor provides Yamaha's YMersion 3D and DirectSound 3D support, as well as stock FM synth crap. Throw in full-duplex 16-bit digital audio, and you're ready to roll, though NT users will have to record at the same bit rate and frequency as WAV playback.

The DB60XG is a WaveBlaster-compliant daughterboard brimming with 4MB of non-upgradable wavetable ROM, and is fully GMIDI- and XG-compliant (XG is Yamaha's extended General MIDI standard that adds more patches and channels, but has gone nowhere fast). You also get 32-note polyphony with a total of 676 voices. Using the Control Panel, you can add all manners of special effects to your tones, including multiple levels of reverb and echo. You can even have up to three programmable effects running simultaneously.

Given the abundance of on-board jumpers, the 3D-XG takes up about as much resource real estate as a SoundBlaster/MIDI card combo: three I/O addresses, two IRQs, and two DMAs. Legacy support for Sound Blaster Pro is handled without resorting to TSRs. Would-be MIDIphiles get their choice of synthesized sounds: OPL3-SA3 FM synth (shhhrink!), OPL-SA3 GM Soft Synth (ugh...), and MPU-401 output (yes!). Speaking of outputs, 1/8" mini jacks are the connections of choice for the 3D-XG, with mic- and line-in, and amplified and low-level outputs linking your equipment together. A standard joystick port, which also seconds as a MIDI port via packaged cabling, is also present. But if this is supposed to be some professional digital sound card, where's the SPDIF?

Installation is painless, as the card properly configures itself with a single pass on the install process. Drivers are included for every flavor of Windows (including 3.1x, 95, NT, Windows 98… even Unix!). Once your two drivers are in place (one for the audio and the other for the joystick), it's time to play.



Audiotrix 3D-XG Mixer - Default
File Options Help
MASTER
Volume
DIGITAL CONTROL
Volume Reverb Chorus Variation
EFFECTS
☐ Refresh
☑ Lock
MIDI >>
Default
Multi-OPL3-SA MPU MIDI OUT

Reverb: Room1
Chorus: Chorus3
Variation: No Effect

Audiotrix comes with a boatload of software. From here, add up to three levels of eeecchhooo and reverb.

But if you're hoping to play multi-channel digital sounds in hardware, dream on Skippy, 'cause unlike Xitel's Storm and Diamond's Monster Sound, the 3D-XG only plays a single digital sample at a time.

Under DOS, the 3D-XG works flawlessly, thanks to the tiny init3DXG.exe file that configures DOS settings. All the games we threw at it worked, but the voices in *Dark Forces* had a raspy edge—otherwise *Quake* and *Duke3D* played fine. And Win95 performance is just as flawless.

When it comes to MIDI, why piddle around with FM synth crap when that juicy DB60XG is sitting in the socket? Backwards compatibility, perhaps. But when a game gives you the option for WaveBlaster/MPU-401 MIDI playback, choose it. Especially if you want 4MB of rockin' patches pounding your ears. While the strings and horns edge towards the synthesized, the percussions, pianos, and pizzicatos soar, as does the upright bass and reed instruments.

Is the Audiotrix 3D-XG in the same league as the Turtle Beach Pinnacle reviewed in *boot* 11? No. While it certainly delivers high-quality MIDI, the lack of a SPDIF doesn't make sense given the pro-caliber price tag.

—Andrew Sanchez

***THE BUNDLE:** Cakewalk Express 5.0, CoolEdit Pro SE, Hotz Trax, XG Edit*

Price $295
Company Mediatrix
Phone 800.820.8749
URL www.mediatrix.com

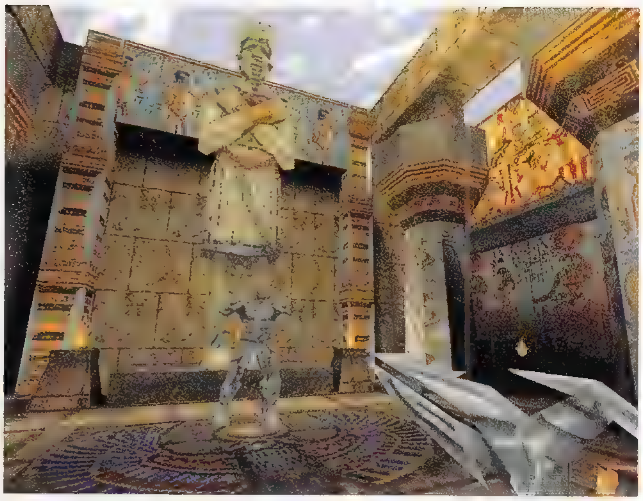
boot verdict 6

Hexen II

Apocalypse yeeow!

While Quake's console is still in full effect, performance freaks must get their hands on GLQ+, a mighty fine freeware program by Bjorn Stensrud that optimizes GLHexen II to get the best frame-rates easily via a point-and-click interface.

TRY IT ON THE DISC

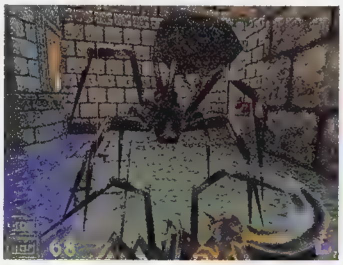


You'll pray for sweet oblivion once the fist of a Golem clocks you upside your head.

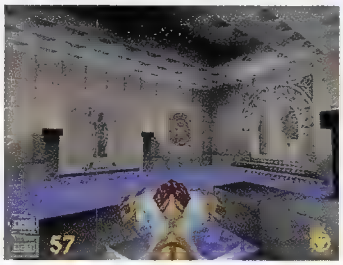
boot KICK ASS! PRODUCT

The best first-person gaming engine just met the most compelling indoor and outdoor levels to date. The first of many upcoming *Quake*-powered fragfests, *Hexen II* takes you on an odyssey replete with mounds of medieval might, magic and mayhem. This time you're one of four different types of adventurers—Paladin, Crusader, Assassin or Necromancer—facing off against Eidolon, the last Serpent Rider, and his Four Horsemen of the Apocalypse.

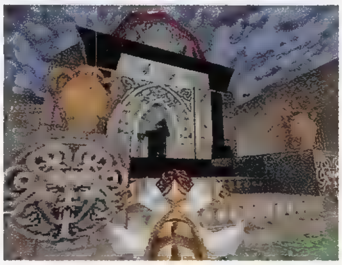
Upon entering this ravaged Win95-native landscape, this third incarnation of *Heretic* may seem like a simple medieval-flavored *Quake*-hack. But while the underlying technology driving *Hexen II* looks and feels familiar, if you dig deeper you'll uncover many twists and turns, and forget the id-ly influence.



An arachnid horde gets ready to sink some fangs. Show 'em who's gonna live to see the next day.



When in Rome, frag like the Romans do—but do it with a smile in Hexen II.



Each realm is texture-mapped to match a specific time period.

The old find-the-exit gameplay has been ditched. Now you must find mission-critical objects, and know how to manipulate them. The game also adds an inventory management system with tons of power-ups, armors, and magical artifacts to use and abuse. Speaking of manipulation, *Hexen II*'s fully interactive environment now allows you to aim and fire stationary parapet-mounted crossbows, launch catapults, and destroy objects at will. From shrubbery to sheep, none shall be spared. Push a barrel to block a door, or bust a gravestone—it's all in there.

You can't just recklessly run into *Hexen II*'s unknown without the proper weaponry and armor. If you find yourself being assaulted by a horde of scorpions and you're fresh outta manna, it's dirt nap time. Both the strong one-player adventure and mayhem-inducing 16-player fragfests showcase the game's RPG elements. Each character has specific strengths and weaknesses, gains experience and powers as the game progresses, and uses artifacts, which have different effects depending on the user. This leads to delectable deathmatches, where creatures are summoned to run rampant, and the close-ranged combat is fast and furious. Unlike play in *Quake*, you can see which weapon your opponent carries. A Crusader will freeze your ass with the ice mace, then switch to the warhammer to crack your cranium. Weapons, as before, can be powered up, so an Assassin's scarab-shootin' Staff of Set becomes a *Hellraiser*-inspired flesh-renderer.

CHECKLIST

Maximum Resolution/Color
1280x1024/8-bit
800x600/16-bit (OpenGL)
Win95 Native
3D Software Acceleration
OpenGL
Multiplayer
Internet IPX

Adding hub design allows you to jump between levels; each of the four continents are lavishly texture-mapped to fit the realm. Enter the jungle world of Mazaera, and behold stone temples bathing in a lava lake. And nothing takes your breath away like stepping into the Cathedral for the very first time—the breakable stained-glass windows and high arches are straight out of European architecture.

But behind lush flora is fatal fauna bent on seeing your blood spill, and these beasts prove just as impressive. From the airborne imps and armies of arachnids that pounce too realistically for words, to the massive end-level Horsemen, each creature's attacks and animations are smoothly animated and lifelike.

Special effects galore bombard your senses, from shadows, real-time scaling polygons, semi-transparent creatures, and alpha-channeled waters, to a multitude of particle effects depicting flying body fluids, magical attacks, and even rain.

You'll need a processor with strong FPU and a stronger video card to get *Hexen II* in the 10 to 15fps range for SVGA. Throw in a 3Dfx card and fire up *GLHexen II*, and 640x480 flows at 20+fps, and all those hardware-accelerated eye tricks appear—Qrad/flash blended lighting, bilinear filtering and underwater warping effects. While 3Dfx is currently the OpenGL accelerator of choice for *GLQuake*-engine games, any GL driver-armed 3D hardware accelerator can take advantage of *GLHexen II*.

The only thing disrupting all this magic is long load times and the occasional hiccup when the game loads special effects. Also, a known bug allows players to use cheats in multiplayer gameplay, resulting in über-fraggers reigning terror on the uninitiated. And there's no modem or serial port connections allowed for two-player head-to-head—you're either TCP/IP or IPX.

But with its generous heaping of role-playing, nasty monstrosities lurking in the shadows, and equally compelling single and multiplayer experiences, *Hexen II* will enthrall you.

—*Andrew Sanchez*

Price $50
Developer Raven Software/id
Publisher Activision
Phone 310.473.9200
URL www.activision.com

boot verdict 9

IF GUNS FAIL, BRING IN DOGS.

IF DOGS FAIL, BRING IN TEAR GAS.

IF TEAR GAS FAILS,

BRING IN HELICOPTERS.

DARYL F. GATES'
POLICE QUEST
SWAT 2

Welcome to the world of Daryl F. Gates and the LAPD. Here, a thin blue line separates law-abiding society from kooks, crazies, terrorists and sociopaths. The choice is yours. Join the good guys and learn LAPD SWAT tactics, strategies and scenarios. Or become one of society's miscreants, and take it to the establishment with grenades and rocket launchers. Alone or on-line, no two missions are alike. It's not just another day in L.A. Then again, it is. Available December 1997.

SIERRA®

IF HELICOPTERS FAIL,

BRING IN THE NEGOTIATION TEAM.

Demo at www.sierra.com/swat2.

Product Information Number 312

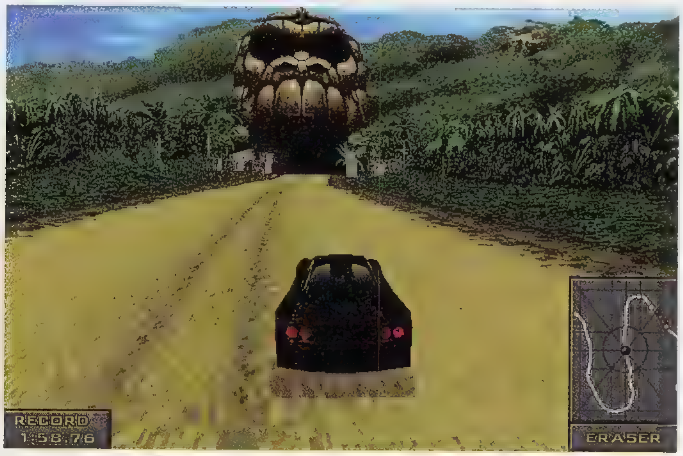
Need for Speed 2 Special Edition

Good speed, bad idea

TRY IT ON THE DISC

Hop behind the wheel of a car that costs more than your house, and tear up the streets of Mexico with *Need for Speed 2 SE.* All from the comfort of your PC—and smooth as silk, providing you have the hardware to drive this beauty.

Unlike most special edition versions—which are usually crippled for bundling—*Speed 2 SE* is an enhanced edition that offers four more cars, a new track, and the 3D acceleration that should have come with the original game. Most companies post free patches for 3D acceleration, but EA says it isn't planning to do this. So, if you really have the need, you'll have to shell out $50 for this update. EA says special pricing will be available for owners of the original game, although nothing had been announced as of press time.



Need For Speed II SE's new track takes you to the sunny land of Mexico.

On a P200 MMX with 3Dfx, the game's framerate will blow you away, even with all the options turned on. Detailed texture-mapping, dynamic lighting, and gouraud shading can't drag the rates below 30fps. Unfortunately, the DirectX version looks flat and doesn't move nearly as fast.

Multiplayer capabilities are limited to split-screen mode. Network/online multiplayer modes would have greatly enhanced replay value, although the AI does deliver a solid challenge. Maybe EA will release another $50 upgrade to add multiplayer mode. Of course, that one won't be accelerated, and you'll have to buy another upgrade to get both features.

—Paula Reaume

CHECKLIST

Maximum Resolution/Color
640x0480/16-bit
Win95 Native
3D Hardware Acceleration
3Dfx Voodoo
DirectX
DirectDraw DirectSound
DirectInput
MMX Enhanced
Specialty Controllers
Force Feedback

***Price* $50**
Developer/
***Publisher* Electronic Arts**
***Phone* 800.245.4525**
***URL* www.ea.com**

boot verdict 6

Pro Pinball: **Timeshock!**

Best pin sim ever

boot KICK ASS! PRODUCT

TRY IT ON THE DISC

Timeshock! is the most sophisticated, satisfying pinball sim ever created. With ramps, habitrails and dot-matrix fanfare galore, it's as lusciously complex as any metal-and-plastic Williams table, and boasts a physics model that is indistinguishable from real arcade action. With proper English, you can bounce the ball off the overhead glass for that familiar pop. And if your game really gets out of hand, you might find your ball stuck in some hidden cranny in the upper region of the table.

The game's globe-hopping time-travel plot is contrived, but does lend a semblance of logic to the numerous explorations and multiball modes you need to reach scores in the billions. The rules are incredibly complex–so why not customize an easier table?

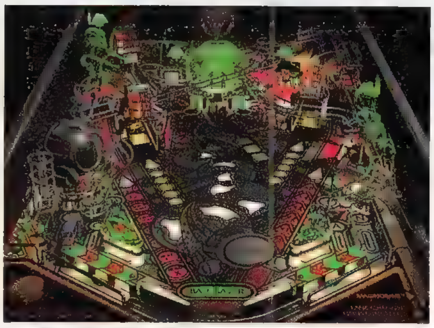
Timeshock! rewards high scoring players with "operator's rights" so you can adjust "factory presets" such as the maximum number of extra balls available during a single game. Sadly, there's no way to mitigate the uselessness of the MagnoSave button, which is supposed to save balls from the right outlane, but is too hard to trigger during the heat of action.

The table is SGI 3D-rendered, and looks stunning at the max graphics setting of 1600x1200/24-bit color. Unfortunately, action runs in fits and starts in high-detail settings, especially during six-ball multiballs (an 8MB video card is recommended for best performance). But drop down to 800x600/8-bit color, and you still have the best pinball simulation ever made.

—Jon Phillips

CHECKLIST

Maximum Resolution/Color
1600x1200/24-bit
MS-DOS
Win95 Native
WinNT Compatible
3D Sound
Dolby Surround
DirectX
DirectDraw DirectSound
DirectPlay DirectInput
MMX Enhanced



Four lanes, three orbits, three ramps, two banks of drop targets, one bumper cluster, a rotating crystal and a mechanical time machine must be triggered in just the proper order to unlock Timeshock!*'s vast points potential.*

***Price* $39.95**
***Developer* Empire**
***Publisher* Empire**
***Phone* 800.216.9706**
***URL* www.empire-us.com**

boot verdict 9

Age of **Empires**

Warcraftilization

TRY IT ON THE DISC

Age of Empires is an intelligent combination of the discovery and research aspects of *Civilization* and the real-time strategy elements of *WarCraft*. The result is an intricately detailed game with an innovative technology tree, sharp unit animations, and well-balanced gameplay that keeps you glued to your computer better than a heroin-laced keyboard.

Unlike traditional real-time strategy games, victory in *AOE* isn't always gained through military might. To be successful, you'll need to advance your civilization through several historical ages. The technology tree is straightforward, starting at sticks and stones and taking you all the way to chariots. Progress up the tech tree is accomplished according to how successfully a civilization grows.

Multiplayer games are balanced with unique tech trees that give no single civilization all the possible technologies. There are a total of 12 different civilizations to choose from, ranging from the early Sumerians to the Shang Dynasty. *AOE*'s single-player campaigns take place in ancient Egypt, Greece, Babylon and Japan for a total of 36 individual scenarios. Add 13 pre-created multiplayer scenarios and random map generation, and you've got a game you can lose yourself in for several months.

A high-res isometric sprite-based engine drives *AOE*'s graphics. Unfortunately, the terrain is straight out of last year, with tiles showing their seams and blocky areas outlining line of site. Each unit and building has been created and animated as a 3D model, and then converted to a 2D sprite.

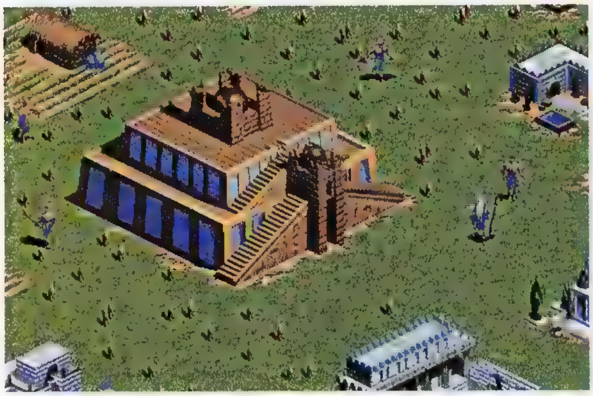
The little people that populate *AOE* are the real stars of the game. This is especially true of the villagers, who are your resource gatherers and builders. Each is animated with incredible precision and fluidity. Point one at a deer, and he'll throw spears at it until it falls. Then he'll carve it up, and waddle back to town with the big slab of meat cradled in his arms. The AI is even more impressive, allowing villagers to autonomously search for wood and food if left alone. Enemy units will either target the weakest opponent or the most dangerous, such as catapults and priests.

AOE's opposing AI is built around a strategy playbook. Attacks and defensive maneuvers can be set up and scripted so that the cavalry will intercept units attacking catapults, or swordsmen will move forward to protect retreating priests. Unfortunately, the computer opponent repeatedly gets hung up with some storage pit or farm in a non-strategic position, ultimately devoting a large portion of its resources to eliminating it.

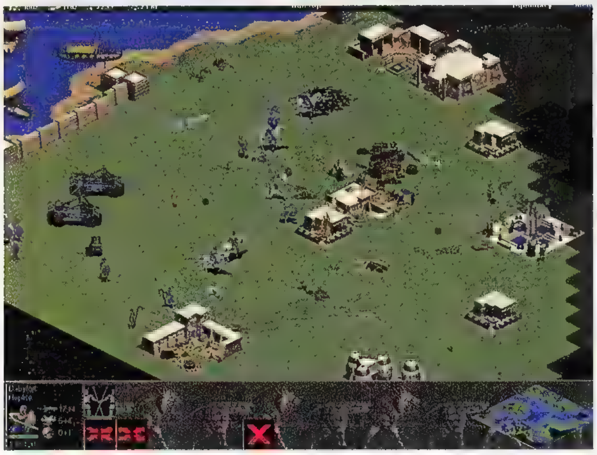
What's really amazing about *AOE* is how open-ended it is. The scenario editor has the power to create both individual scenarios (either randomly or by placing each little pebble) and entire campaigns (by stringing along a group of scenarios). In constructing a scenario, everything is customizable, from starting age and amount of resources, to victory conditions and computer opponent personality. For those who really feel the need to tweak, adjustable files contain the underlying strategy of computer opponents, determining what a computer opponent will research and build, and which units will be trained, and in what quantities.

Included with the game is a 40,000-word encyclopedia disguised as a manual. This is a great starting point for information on the different cultures in the game as well as a great reference on ancient warfare. As a complete package, *Age of Empires* has a complexity that's missing from the glut of real-time games currently hitting the shelves.

—Sean Downey



Your civilization can culminate its achievements by building a wonder.



Vanquishing your opponent is a physical affair.

CHECK**LIST**

Maximum Resolution/Color
1024x768/8-bit

Win95 Native

WinNT Compatible

DirectX
DirectDraw DirectSound
DirectPlay

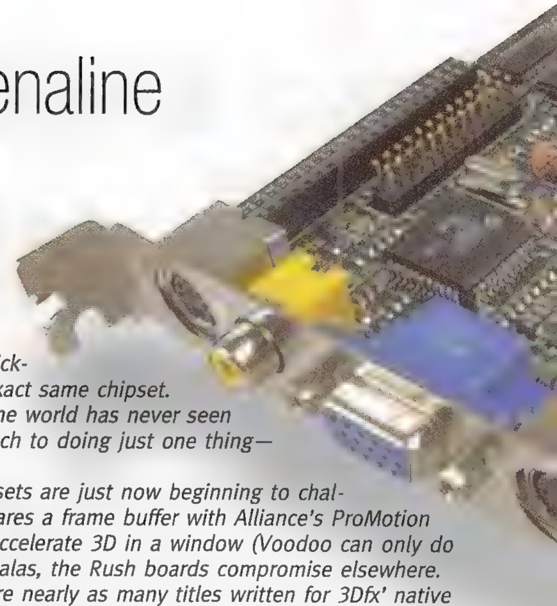
Multiplayer
LAN Modem Direct/serial
Internet

Price $45
Developer Ensemble Studios
Publisher Microsoft
Phone 800.426.9400
URL www.microsoft.com/games

boot verdict 9

Voodoo Madness: Jazz Adrenaline **Rush**, Intergraph **Intense** 3D Voodoo and Canopus **Pure3D**

Everybody's doing that black magic boogie



In November of 1996, we awarded the first two Voodoo-based boards our coveted Kick-Ass award. Now, a year later, we're doing the same for a new board based on the exact same chipset. Such longevity is unheard of in the fast-paced graphics chip world. But then again, the world has never seen a chipset so perfectly suited to its task. The Voodoo takes a no-compromises approach to doing just one thing—delivering arcade-quality 3D graphics to the PC—and does it amazingly well.

The 3D-only gamble paid off: Voodoo has become the standard that new 3D chipsets are just now beginning to challenge. In the past year, 3Dfx' only new release has been the Voodoo Rush, which shares a frame buffer with Alliance's ProMotion 2D chipset. Rush boards rectify the original Voodoo's biggest flaws: the inability to accelerate 3D in a window (Voodoo can only do full-screen), and the consumption of a second PCI slot for 3D-only functionality. But, alas, the Rush boards compromise elsewhere.

The Voodoo's head start makes it the undisputed king of the content hill; there are nearly as many titles written for 3Dfx' native Glide API as there are for Direct3D. So while the technology may be a year old and the Voodoo 2 looms early on next year's horizon, you'd be a fool not to consider working a little Voodoo magic under this year's Christmas tree.

—Chris Dunphy

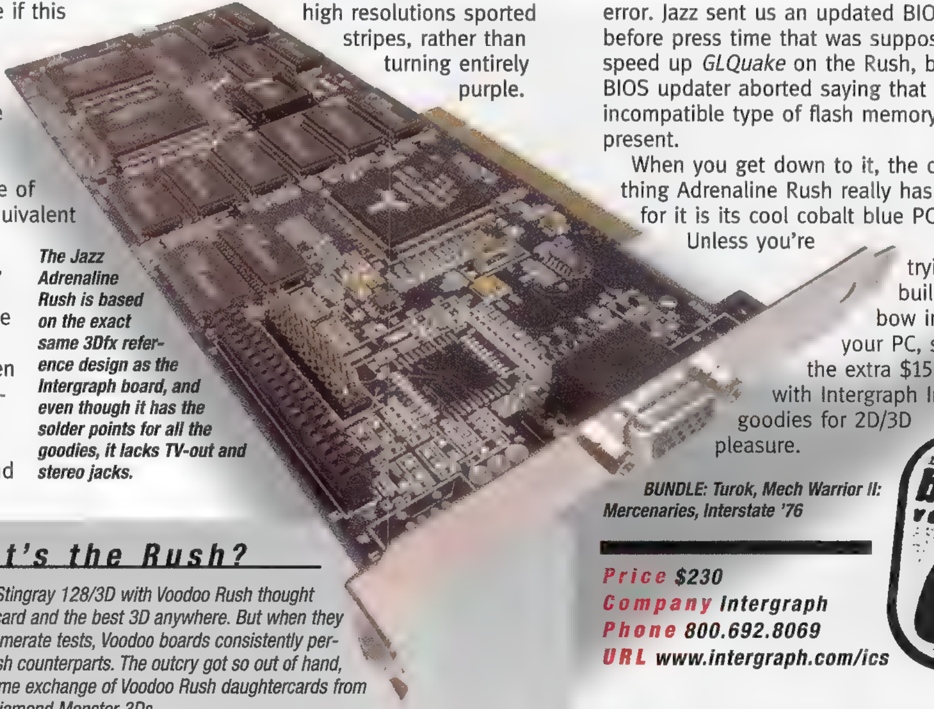
Jazz **Adrenaline** Rush

The Adrenaline Rush is based on the same reference design as Intergraph's Intense Voodoo, except all the extras have been plucked off. This might be fine if this lowered the price significantly, but the Adrenaline rings up only $15 cheaper than the Intergraph. And the Adrenaline packs even more annoying glitches.

The 2D and 3D performance of the Adrenaline was roughly equivalent to the Intense, and in some cases exceeded it. The drivers, however, are primitive—it appears Jazz did nothing to the references drivers provided by Alliance. The control panel even tempts you with TV-out adjustments, even though the board hasn't implemented that feature. And as for resolutions and color depths, the Adrenaline's drivers are more limiting. The video-in-a-window playback was better than the Intense, but still distorted. Large windows at high resolutions sported stripes, rather than turning entirely purple.

Though the board reports a VESA 2.0-compatible BIOS, trying to change into a VESA resolution results in Quake aborting with an "unable to set VESA palette" error. Jazz sent us an updated BIOS right before press time that was supposed to speed up *GLQuake* on the Rush, but the BIOS updater aborted saying that an incompatible type of flash memory was present.

When you get down to it, the only thing Adrenaline Rush really has going for it is its cool cobalt blue PCB color. Unless you're trying to build a rainbow inside your PC, spend the extra $15 and go with Intergraph Intense goodies for 2D/3D pleasure.



The Jazz Adrenaline Rush is based on the exact same 3Dfx reference design as the Intergraph board, and even though it has the solder points for all the goodies, it lacks TV-out and stereo jacks.

***BUNDLE:** Turok, Mech Warrior II: Mercenaries, Interstate '76*

Price $230
Company Intergraph
Phone 800.692.8069
URL www.intergraph.com/ics

boot verdict 6

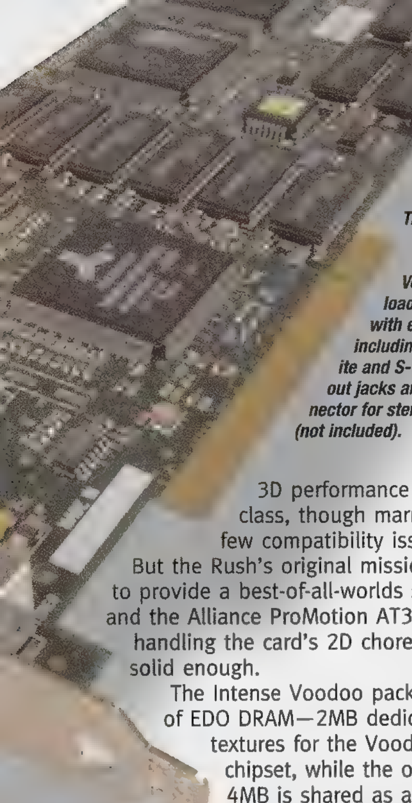
Slow down. What's the Rush?

Gamers who bought the first Hercules Stingray 128/3D with Voodoo Rush thought they would be getting both a good 2D card and the best 3D anywhere. But when they went to run the all-important Quake *framerate tests, Voodoo boards consistently performed about 30% faster than their Rush counterparts. The outcry got so out of hand, 3Dfx went so far as to offer a limited-time exchange of Voodoo Rush daughtercards from Hercules boards for Voodoo-powered Diamond Monster 3Ds.*

Intergraph and Jazz said the problem was Hercules' fault, and would not occur in their boards. Meanwhile, 3Dfx created the impression that the Rush was defective and was being recalled. The truth, however, is much simpler. The Rush isn't a poorer 3D chip than the Voodoo, it just has a slightly different memory interface, which is necessary to allow sharing the frame buffer. In most cases, Rush performance should be roughly the same as a similarly tweaked Voodoo. But when scenes involving both alpha-blending and Z-buffering are being drawn (such as in GLQuake*), the nature of the Rush's memory interface causes page faults, which result in slowdowns. 3Dfx and all the board makers have been working to optimize Rush drivers to work around the problem, and we recently witnessed a demonstration of a tweaked Jazz Adrenaline Rush running* Quake *just 2fps slower than Diamond's Monster 3D.*

Intergraph **Intense 3D** Voodoo

The Intergraph Intense 3D Voodoo is the best Voodoo Rush board we've seen to date, the hybrid's intrinsic flaws notwithstanding (see sidebar). As expected, the



The Intergraph Intense 3D Voodoo is loaded down with extras, including composite and S-Video TV-out jacks and a connector for stereo glasses (not included).

3D performance is world class, though marred by a few compatibility issues. But the Rush's original mission was to provide a best-of-all-worlds solution, and the Alliance ProMotion AT3D chip handling the card's 2D chores is solid enough.

The Intense Voodoo packs 6MB of EDO DRAM—2MB dedicated to textures for the Voodoo chipset, while the other 4MB is shared as a frame buffer between the 2D and 3D sides. A 220MHz RAMDAC delivers fair high-resolution support, but the lack of a packed-pixel mode fills up that 4MB frame buffer quickly when running with 24-bit color. The 2D performance is decent, but the drivers lack support for some of the display utility niceties we've come to expect, such as a virtual desktop.

The Intense Voodoo's biggest claim to fame is its TV-out functionality, and unlike the nVidia boards reviewed in this issue (page 104), the Intense actually does this quite nicely. Composite and S-Video jacks pump resolutions below 800x600 to your big screen. And unlike with nVidia, your monitor remains simultaneously active. Picture quality is excellent, and Intergraph allows you to tweak everything. A stereo glasses jack rounds out the panel, though few titles take advantage of this feature.

Unfortunately, several annoying glitches plague this otherwise fine board. Video-in-a-window drifts toward purple when pushed to full-screen at high resolutions (otherwise, the quality is above average), and after a while the monitor settings become corrupt—forcing 640x480 screens to fill only the bottom half of the monitor. Only a complete driver re-install fixes the problem. But if you crave Voodoo and can't spare another PCI slot, Intense 3D Voodoo is the best way to go.

BUNDLE: Jane's AH-64D Longbow FX (Glide), Motoracer (D3D), Turok

Price $215
Company Jazz Multimedia
Phone 408.727.8900
URL www.jazzmm.com

boot verdict 8

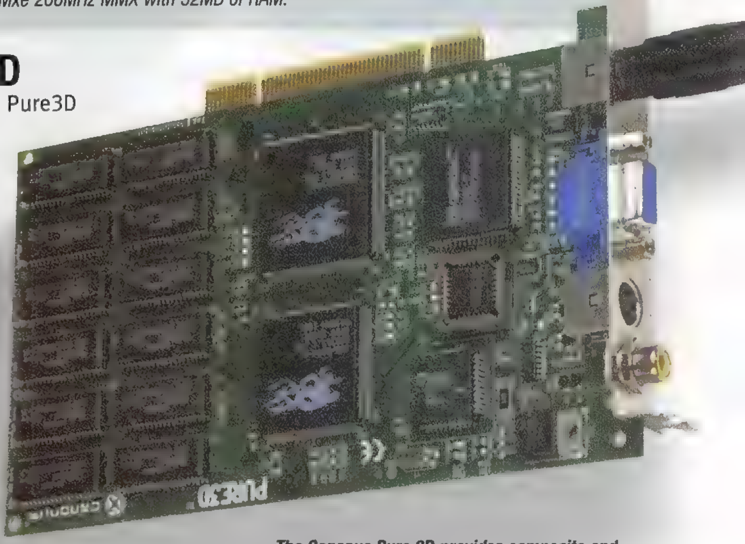
Dare to Compare

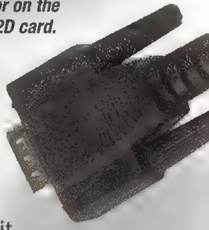
	Adrenaline Rush	Intense Voodoo	Pure3D
Max 24-bit resolution/refresh	1024x768/75Hz	1152x864/60Hz	N/A
Max 16-bit resolution/refresh	1600x1200/60Hz	1600x1200/60Hz	N/A
VESA 2.0 Support	Yes	Yes	N/A
Virtual Desktop Support	No	No	N/A
MDK Perf-Test	93	94	N/A
Quake 640x480	Fail	15.9fps	N/A
Quake 800x600	Fail	11.1fps	N/A
Final Reality Overall	Fail	Fail	N/A
FR 2D	2.05 R-Marks	2.08 R-Marks	N/A
FR Bus Speed	1.47 R-Marks	1.42 R-Marks	N/A
FR 3D	Fail	Fail	2.81 R-Marks
FR Polygons	73.17 Kpoly/s	75.52 Kpoly/s	76.68 Kpoly/s
FR Fill	25.24 Mpixels/s	27.95 Mpixels/s	17.98 Mpix/s
FR Robots	Fail	Fail	28.31fps
FR City	Fail	Fail	33.32fps
X Demo (800x600)	37.203fps	35.479fps	38.27fps
GLQuake (640x480)	19.9fps	22.2fps	27.3fps
GLQuake (800x600)	12.9fps	14.2fps	Fail
TerraMarks (Level 1/2/3)	327 /325 / 316	290 /291 /285	Fail

Test machine was a Micron Mxe 200MHz MMX with 32MB of RAM.

Canopus **Pure3D**

boot KICK ASS! PRODUCT





The Canopus Pure 3D provides composite and S-Video TV-out. The other connector on the back wires to the VGA out of your 2D card.

The Canopus Pure3D ignores the rush to Rush, and takes Voodoo's traditional 3D-only board design to new heights. Packing twice the texture memory of other Voodoo boards, Pure3D adds TV-out, which not only puts Voodoo on the big screen, but also turns your 2D output into NTSC if you set your desktop to 640x480 at 60Hz.

The Pure3D's control panel is full-featured and easy to use, with a slider to overclock the memory on-board from 50Hz up to 60Hz, and a whole slew of tweaks to get the best picture. The TV-out quality is superb, and thankfully, your monitor remains simultaneously active. Pleasantly, the pass-thru added no distortion to the 2D signal when the Voodoo wasn't active, allowing even a crystal-clear 1600x1200 desktop. Very nice.

The Pure3D continues the Canopus tradition of taking proven technology and providing the best implementation of it anywhere. Its Total3D was the best Verite 1000 board, and now the Pure3D sets a new standard for what Voodoo can be. For the full Canopus experience, its "Rush Buster" package combines the Pure3D and the Total3D for $299. Current Total3D owners can buy the Pure3D for $159.

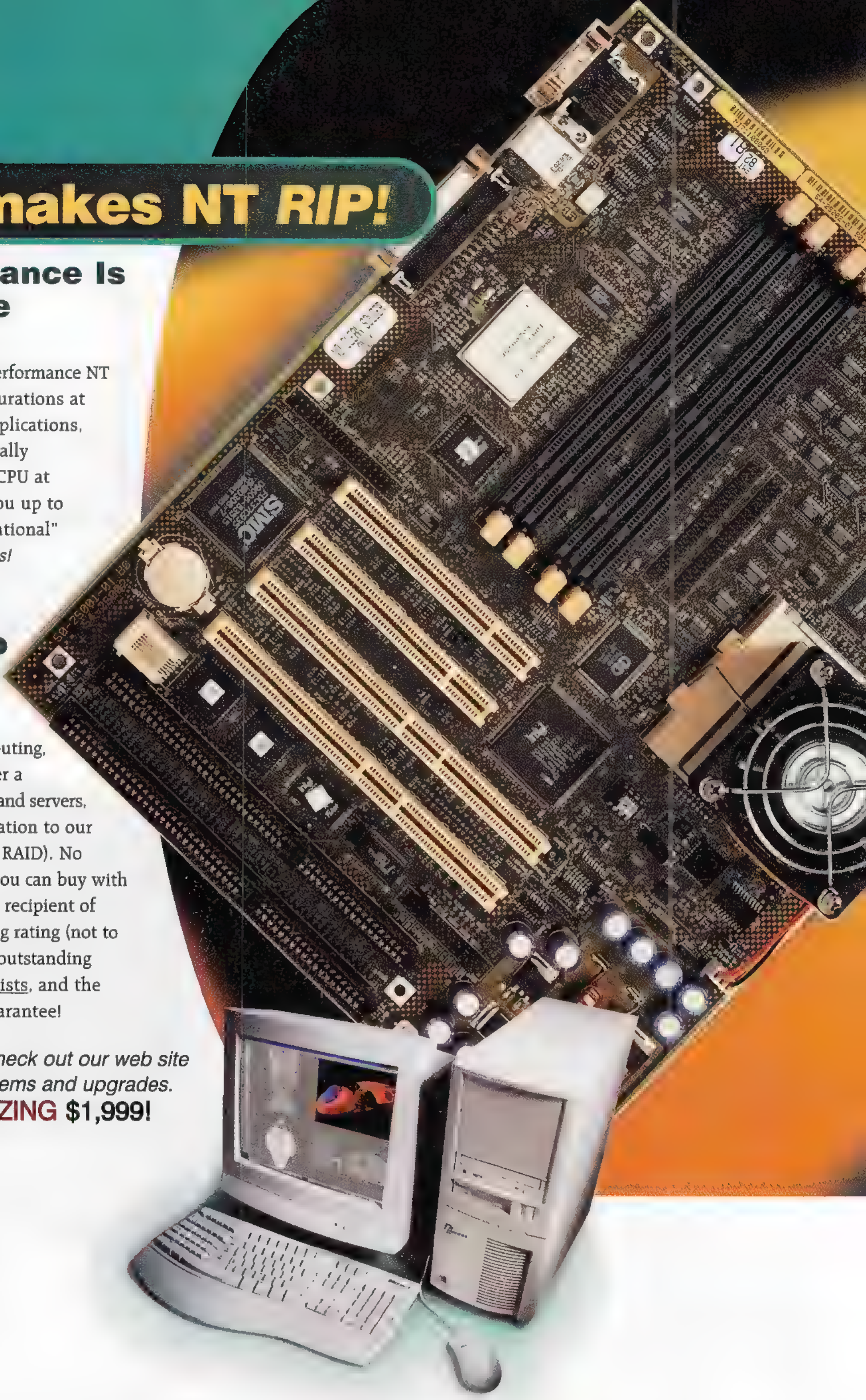
Symbolic of the lack of software bundled with the Pure 3D, no software has yet taken advantage of the extra 2MB of texture memory on-board. Once it does, the Pure3D will be even further cemented as the pinnacle of the Voodoo experience.

BUNDLE: None

Price $179 (6MB: 2MB Frame/4MB Texture)
Company Canopus
Phone 408.954.4500
URL www.canopuscorp.com

boot verdict 9

533MHz makes NT *RIP!*



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- Wright Design 1.0
- Digital FX!32 Binary Translator
- 3-year limited warranty

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>
> ***Chris MacIntire***
> ***Head of Production***
> ***Unified Film Organization***

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www.enorex.com

Product Information Number 133

Socket 7 **Slugfest**

Motherboards get down and digital

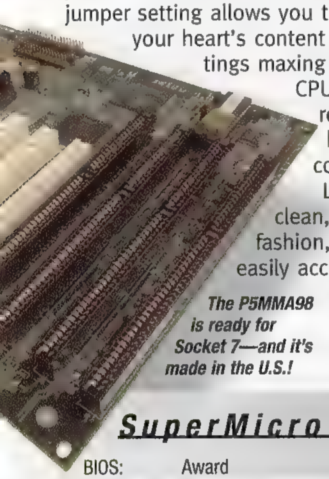
With Intel and AMD dropping the price bomb across their entire Socket 7 lines, that 233MHz CPU is lookin' sexier every minute. And if your current motherboard doesn't support MMX, here are three of the latest mommies, all armed with Intel's UDMA-supporting 430TX PCIset, and ready to feel the touch of your screwdriver.

—Andrew Sanchez

SuperMicro Super P5MMA98

Sporting one of the last "Made In The USA" stickers, SuperMicro's Super P5MMA98 ATX motherboard comes loaded with twin USB ports. Full ACPI compliance means any compatible OS can take advantage of PC98 power-management features, and a 75MHz jumper setting allows you to overclock to your heart's content (multiplier settings maxing out at 3.5x). CPU temperature is reported upon boot-up—a very cool feature. Laid out in a clean, comfortable fashion, with RAM easily accessible and drive header connectors safely out of the way, the P5MMA98's only design flaw is the close proximity of the header connectors to the bottom-most ISA slot.

The P5MMA98 out-performed the batch of Socket 7/430TX boards reviewed in *boot* 11, with excellent marks across the board. The Tekram P5T30-WS reviewed last on this page, however, edges it out across almost every benchmark. Still, coming in second in this particular showdown ain't bad.



The P5MMA98 is ready for Socket 7—and it's made in the U.S.!

SuperMicro Stats

BIOS:	Award
CPU SUPPORT:	Intel Pentium P54C 75-200MHz; P55C (MMX) 166-200MHz; AMD K5, K6; Cyrix 5x86, 6x86
L2 CACHE:	512K soldered pipeline burst SRAM
RAM SLOTS:	Four SIMM, two DIMM
MAX RAM:	256MB FP, EDO, SDRAM
EXPANSION:	Three PCI, three ISA, one PCI/ISA shared

***Price** $169*
***Company** SuperMicro*
***Phone** 408.895.2000*
***URL** www.supermicro.com*

boot verdict 8

M-Tech MIG-R539

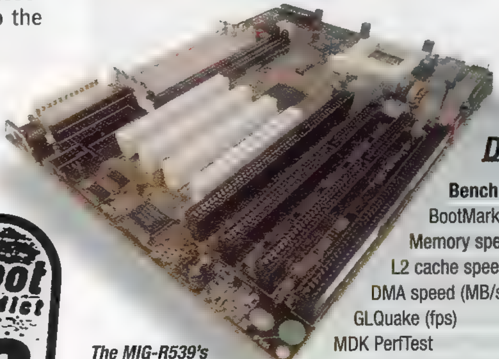
Shackled to an AT case? Then M-Tech's MIG-R539 could be your ticket to 430TX freedom—but because of its AT nature, you'll have to give up an ISA expansion slot for USB. Both AT and ATX power connectors are available, while all header connectors are neatly positioned in one corner of the board. Like all AT boards, the CPU blocks full-length expansion cards, and the MIG-R539 is no exception, but M-Tech has managed to place the processor so it only blocks two of your four PCI slots. On the performance tip, the MIG-R539 is solid, but DMA speeds seem sluggish. AT is alive and kicking, despite what people say.

M-Tech Stats

BIOS:	AMI
CPU SUPPORT:	Intel Pentium P54C 75-200MHz; P55C (MMX) 166-233MHz; AMD K5, K6; Cyrix 5x86, 6x86
L2 CACHE:	512K soldered pipeline burst SRAM
RAM SLOTS:	Four SIMM, two DIMM
MAX RAM:	256MB FPM, EDO, or SDRAM
EXPANSION:	Three PCI, three ISA, one PCI/ISA shared

***Price** $129*
***Company** M-Technology*
***Phone** 408.441.8818*
***URL** www.mtiusa.com*

boot verdict 6



The MIG-R539's AT formfactor means all you old-school folks can get into the 430TX groove.

The Tekram has just about everything you need.

Tekram Stats

BIOS:	Award
CPU SUPPORT:	Intel Pentium P54C 75-200MHz; P55C (MMX) 166-200MHz; AMD K5, K6; Cyrix 5x86, 6x86
L2 CACHE:	512K soldered pipeline burst SRAM
RAM SLOTS:	Two SIMM, two DIMM
MAX RAM:	256MB EDO or SDRAM
EXPANSION:	Three PCI, two ISA, one PCI/ISA share

Tekram P5T30-WS

Armed with Adaptec's AIC 7880 SCSI controller onboard, Tekram's P5T30-WS ATX motherboard is chock-full of features, and performs like a champ. The top-most PCI slot comes strapped with an Adaptec RAIDport expansion slot to rock them RAID drives. Alongside the normal IDE hard drive connectors, a 68-pin Wide SCSI connector and a 50-pin SCSI connector deal with those SCSI urges. SIMM sockets are right up against the ATX power supply, so you can't remove SIMMs unless you pull out the ATX power cable or use a precision screwdriver to push the clips open. The lack of USB on the ATX I/O connector is a minor annoyance. but is quickly forgotten once you see the benchmarks; this board came out on top in practically all the tests, with the fastest bootMark score ever for a freestanding mo'board.

***Price** $350*
***Developer** Tekram*
***Phone** 510.353.6099*
***URL** www.tekram.com*

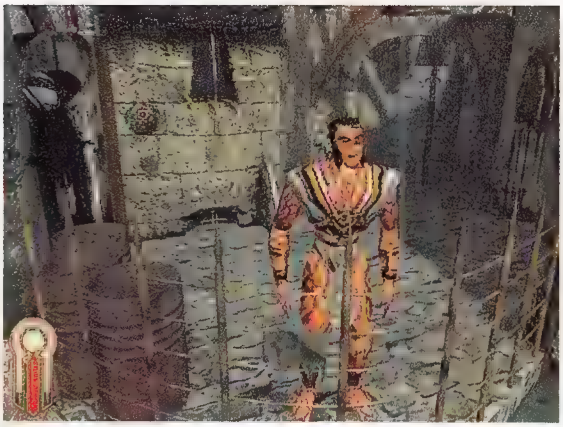
boot verdict 9

Dare to Compare

Benchmark	Tekram	SuperMicro	M-Tech	Tyan S1572
BootMark	56.4	53.8	53.0	52.3
Memory speed (MB/s)	129.9	111.0	111.3	117.1
L2 cache speed (MB/s)	172.4	172.0	172.4	171.8
DMA speed (MB/s)	94.0	91.7	71.2	69.5
GLQuake (fps)	32.0	31.6	32.5	28.0
MDK PerfTest	93.0	93.0	91.0	N/A

Bold indicates better performance; Tyan S1572 reviewed in boot *14.*

***CPU** Intel P55C 200MHz MMX **RAM** 16MB of 72-pin EDO-DRAM **O/S** Windows 95 OSR2.1 Build 1212 **Hard Drive** Quantum 1280A 1.2GB EIDE **CD-ROM** Mitsumi FX120T 12x EIDE **Video cards** Rendition reference board (Verite V1000E) with 4MB EDO-DRAM, Diamond Monster 3D (3Dfx Voodoo) with 4MB EDO-DRAM*



Dark Earth's detailed graphical touches are sure to impress new friends and first dates.

Forgetful Realms

Two new adventure games have you acting the fool

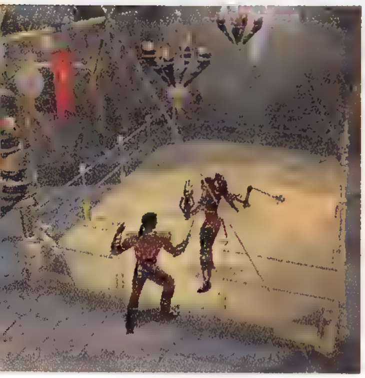
A good adventure game balances the right amounts of puzzles, character development, and FMV. Too little or too much of any of these elements can drive a promising game to an early grave. Westwood and Microprose have been hard at work balancing all the right elements for Dark Earth *and* Lands of Lore: Guardians of Destiny. *Unfortunately the balance is out of whack.*

—Dan Simpson

Dark Earth

TRY IT ON THE DISC

Dark Earth is a grim and brutal adventure game, lavishly detailed and exquisitely conceived. Earth has been pummeled by a wave of asteroids, leaving thick black clouds in their wake. Humanity manages to reconstruct a new society based on the dichotomy of light and darkness. You play Arkhan, guardian of the theologian caste of "Sun-seers."



Combat may be simple, but it is bloody and brutal.

The plot, while rich and deep, is unfortunately linear. There's ample time to explore the city you're in, but plot motivations always lead in a one direction. Dialogue is prerecorded and responses are limited, even when choices are present. Exaggerated body movements make characters look like rapping mac-daddies, turning serious situations to ludicrous.

The polygon-based characters—averaging 800 polygons each—are set against detailed 640x480/16-bit pre-rendered backdrops, allowing for interesting camera angles and dynamic lighting effects. Integration is done well, but between two camera angles, combat can be a tedious affair. In general, combat in *Dark Earth* is rather thin but visually stunning. A simple method of timing offensive blows and defensive maneuvers can be mastered by an average gamer quickly, allowing them to jump headlong into the storyline.

All in all, *Dark Earth* is a visually resplendent adventure full of complex polygon-based characters, lusciously pre-rendered backgrounds, and moderate puzzles. The average adventure gamer will only find a mediocre challenge, but there's still quite a bit of fun to be had along the way.

CHECKLIST

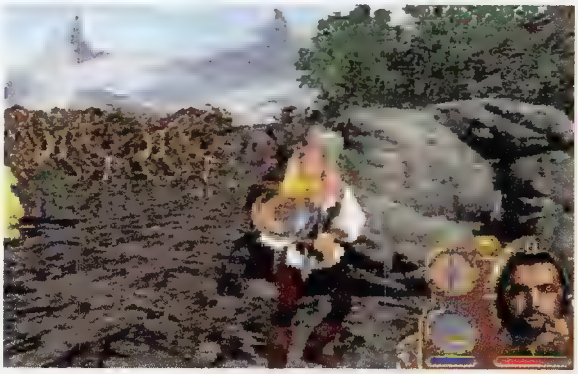
Maximum Resolution/Color
640x480/16-bit
Win95 Native
DirectX
DirectDraw DirectSound
DirectInput
MMX Enhanced
Specialty Controllers
Win95 compatible

Price ***$50***
Developer ***Kalisto***
Publisher ***Microprose***
Phone ***800.695.4263***
URL ***www.microprose.com***

boot verdict 6

Lands of Lore: **Guardians** of **Destiny**

Lands of Lore: Guardians of Destiny is rich with innovative approaches and fantastic settings. In this quasi-RPG/adventure game, you play Luther, cursed by his mother (from the previous *Lands of Lore*) to uncontrollably shapeshift between human, beast, and lizard forms. On a quest to find a cure, you learn that you are the only means of defeating the spawn of an evil god. Despite some neat ideas and innovative approaches, Guardians suffers sorely from dated graphics



Guardians is a smorgasbord of blocky textures and sprites.

The first-person perspective of *Guardians* is overly pixilated at 640x480, adding little flavor to the area. The environment averages 3,000 polygons during gameplay, but the discordant sprites and blocky textures that abound are an eyesore. Thankfully, Westwood has proposed a forthcoming Direct3D patch that should rectify these messy problems. Cumbersome graphics aside, *Guardians* does manage to convey a sense of depth within the environment. Casting a spark flame onto an oil pool will ignite the room, and peeking through cracks in the walls lets you see what's behind them. The FMV and CG sequences are also excellent, combining live actors with rendered backgrounds and creatures. There are several FMV sequences per event, depending on different actions you have chosen. These small details are nice, but FMV is merely FMV, no matter how you cut the codec.

Guardians does manage to pack a significant punch with some innovative ideas and strong storylines. It doesn't push any technological envelopes, but it does offer a fair amount of playability and depth.

CHECKLIST

Maximum Resolution/Color
640x480/8-bit (letterboxed)
MS-DOS
Win95 Native
DirectX
DirectDraw DirectSound
MMX Enhanced

Price ***$50***
Developer
Westwood Studios
Publisher
Virgin Interactive
Phone ***800.874.4607***
URL ***www.westwood.com***

boot verdict 5

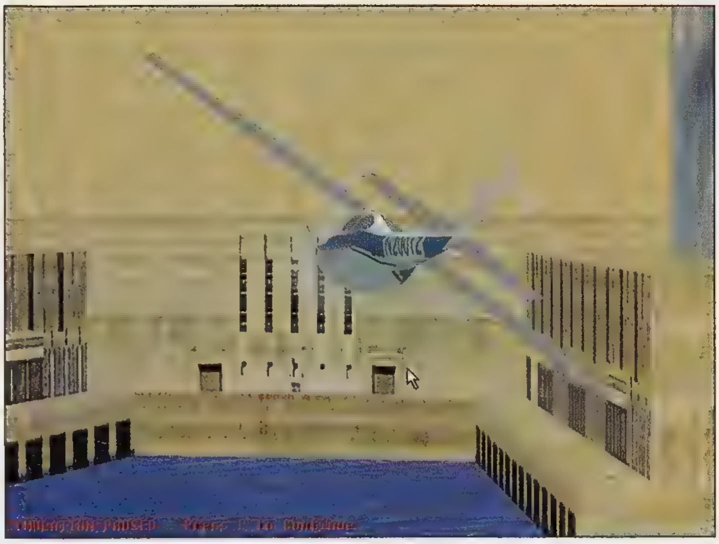
Flight Simulator **98**

A thing of beauty is a joy forever

Few pieces of software have generated the fanatical following of Microsoft's *Flight Simulator*. Five years and running on PC Data's Top 10 chart makes for a lot of happy flyers. The '98 model touches down with more of everything that these PC pilots crave. It is, quite possibly, the single most elaborate re-creation of the piloting experience.

CHECKLIST

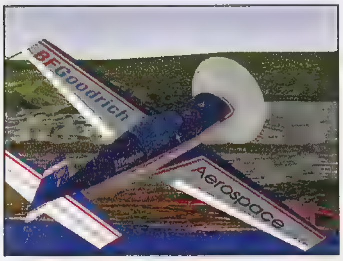
Maximum Resolution/Color
1280x1024+/16-bit+
Win95 Native
WinNT Compatible
3D Software Acceleration
Direct3D
DirectX
DirectDraw DirectSound
DirectPlay DirectInput
Multiplayer
LAN Modem Direct/serial
Internet MS Internet Zone
MMX Enhanced
Specialty Controllers
Force feedback Rudder
Win95 compatible Throttle



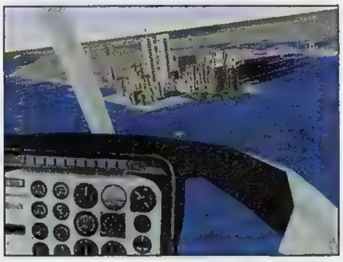
Beautifully textured Hoover Dam is one of the new points of interest.

FS98 features 10 times more airports than *FS95*, bringing the total to 3,000 worldwide; 45 reasonably detailed cities give you interesting terrain to fly over. And more aircraft has been added to the *FS98* roster, the most noteworthy addition being the sim's first helicopter, the Bell 206B JetRanger III.

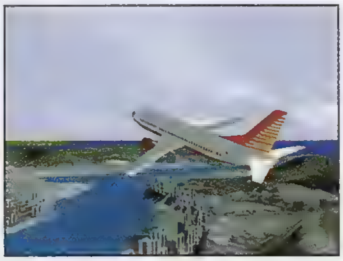
Flight modeling has been fine-tuned throughout, and while *FS98* still doesn't capture the seat-of-the-pants sensation of *Flight Unlimited*, all of the planes respond accurately. This is especially true of the Bell JetRanger, which is by far the most realistic helicopter sim to date, with no compromise on the renowned twitchiness of these crafts.



Aircraft are meticulously detailed, and the terrain features more hills.



The new virtual cockpit looks great, but the instruments don't work.



The Boeing 737-400 looks great over rough Hong Kong terrain.

Other tweaks abound. Instrument panel graphics are sharper, and there's a new virtual cockpit view that lets you look around freely. Unfortunately, the instrument panel is a non-functional bitmap in virtual mode, and often exhibits a surreal warped effect.

The classic sim's aging graphics have at last been upgraded with improved image smoothing and texture mapping, although the improvements come somewhat unevenly. Most textures are more detailed, but actual photographic terrain is only used in one limited sample area. The landscape is much more hilly, but the hills are still no more than textured pyramids.

A big technical improvement is support for 3D accelerators via Windows 95 Direct3D. Our test P166 with a 3Dfx card displayed satin-smooth textures at 640x480, with a frame rate that seemed to max out at about 20fps, showing a faint jerkiness only in the densest 3D urban areas.

Exterior aircraft graphics are superb in any mode, with meticulous detail and shading effects. Acceleration adds some beautiful effects, including absolutely perfect distance haze toward the horizon, gorgeous Caribbean water, and transparent propeller discs. There's also much to be said for 1024x768, even without acceleration. If you have the horsepower to drive it, the extra resolution on both instrument panels and scenery is amazing.

Another obvious improvement is support for force feedback joysticks. Microsoft's own SideWinder Force Feedback Pro offered a very believable tricycle shimmy on taxiing, and admirably subtle stick pressures in turns. But there's still a long way to go. For example, I sorely missed the feeling of thermals bucking to left and right under the long wings of the sailplane, an indispensable cue for soaring.

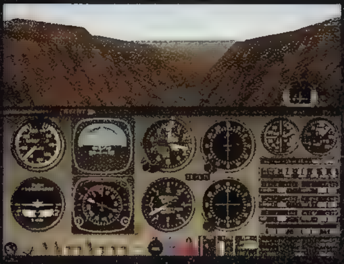
Multiplayer operation is introduced with *FS98*. Using DirectPlay, the software connects via just about any wire you've got, including IPX LAN, Internet TCP/IP, or modem-to-modem. Air combat isn't an option, but there's provision for fly-ins, formation flying, and airshows. Unfortunately, Internet matchup is via Microsoft's punitively byzantine Internet Gaming Zone.

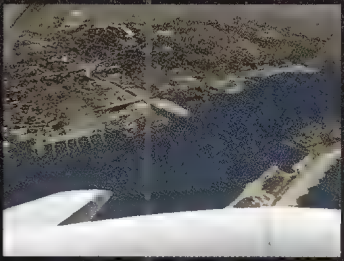
Still, Microsoft has built on its core strengths, expanding its already huge flyable world, and added more airports and navigational aids.

—*Frank Lenk*

Price $60
Developer/
Publisher Microsoft
Phone 206.882.8080
URL www.microsoft.com/games/fsim/

boot verdict
8





It not only sets a new standard in flight simulation, but goes well beyond anything out there. Introducing Sierra Pro Pilot. Never before has a single flight simulator captured this experience so completely. Here, you'll find the broad strokes and the fine touches. You'll choose from a hangar of five civilian aircraft, ranging from the introductory Cessna 172 Skyhawk to the dual-throttled thrill of a Citation Jet. At the other end of the runway are 29 cities and over 3,000 airports, each rendered in exacting detail. All major

WE DIDN'T SET OUT TO JUST A SMALL PART OF

KIDS TO ADULTS
K-A
CONTENT RATED BY ESRB

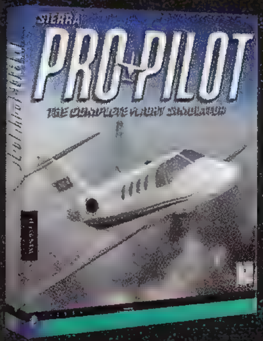
PRE-FLIGHT CHECKLIST

- 3,000 AIRPORTS NATIONWIDE/100% OF CITIES
- 27 MILLION ELEVATION POINTS
- GLOBAL POSITIONING SYSTEM
- LIVE ON-LINE MAP DISPLAY
- AIR TRAFFIC CONTROL
- EVALUATED FLIGHT ASSIGNMENTS
- FLIGHT TUTORIAL
- PHOTOREALISTIC PANELS
- DUAL THROTTLES FOR MULTI-ENGINE AIRCRAFT
- CROSS-COUNTRY NAVAID COVERAGE

Dynamix

rivers, forests and canyons are afforded such faithful geographic representation they could double as a map. Within 25 nautical miles of any city, the flying world is rendered with lifelike realism. You'll hear from Air Traffic Control and other pilots, and learn to navigate the sky with the close company of other planes. Then, upon touchdown, debrief and compare your performance to over 30 full-motion preparation videos. This is Pro Pilot: The Complete Flight Simulator. Both a statement of what a flight sim should be today, and the promise of what one can be tomorrow.

CHANGE THE WORLD.
IT CALLED THE SKY.


SIERRA
PRO PILOT
THE COMPLETE FLIGHT SIMULATOR

SIERRA®

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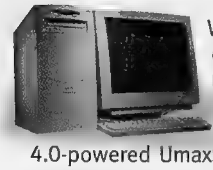
www.sierra.com/propilot

Product Information Number 309

Umax **UmaxStation** 6400

Breaking free from the core



When it comes to being cloned, sheep have nothing on Pentium II workstations. For proof, just look at Umax's NT 4.0-powered UmaxStation 6400.

The rounded tower case hints at Umax' past as one of the first Power Mac cloners, but inside lurks an active-cooled Pentium II processor running at 266MHz. Scooping out the system's guts is a snap thanks to removable sliding panels. Crack the box and you'll find a 440FX-armed Asus KN97-x motherboard with twin USB connectors. Its four SIMM sockets are all filled for a whopping 128MB of EDO-DRAM, leaving a lone DIMM socket free. There are three open PCI slots, but don't even think of slapping a full-length card in the two top-most slots. The 3.5" drive cage blocks them.

A sleep button sits in the upper right-hand corner, which also houses the 3.5" floppy and Panasonic's CR-585 24x EIDE CD-ROM drive. Iomega's Zip drive is also present and accounted for.

Elsa's 16MB (8MB VRAM/8MB DRAM) GLoria-L video card armed with 3Dlabs' GLINT 500TX accelerator and a 19" Hitachi CM-751U monitor handle those warm and fuzzy pixels.

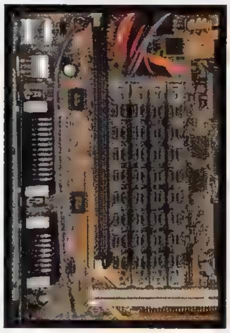
Western Digital's Caviar AC34000 4GB EIDE hard drive handles storage duties. Adding more gigs is easy thanks to the two free 5.25" and lone 3.5" drive bays hiding behind the system's swinging door.

But little things keep getting in the way. Take the keyboard cable that's way too short, barely making it to the front of the monitor. The ATX power supply doesn't help cool the CPU at all, leaving the fan/heat-sink active-cooling combo the sole provider. Also, Yamaha's YST-M25 three-piece speaker system (reviewed in *boot* 13) doesn't please at all. But if you're in a work environment with neighbors galore, the included earphones come in handy.

Under our NT performance benchmarks, the UmaxStation 6400 is on par with other P-II 266MHz systems, although hard drive performance is disappointing for an NT system. Elsa's GLoria-L is also beginning to show signs of age with ViewPerf, scoring below expectation under CDRS and DRV-04. Normally, our benchmarks are run at 1280x1024 in true-color, but 3D Studio Max refused to run in this mode with the supplied GL drivers due to lack of RAM for proper double buffering. But *Debabilizer Pro* processing and our Visual C++ benchmark scores were strong, as was CD-ROM speed.

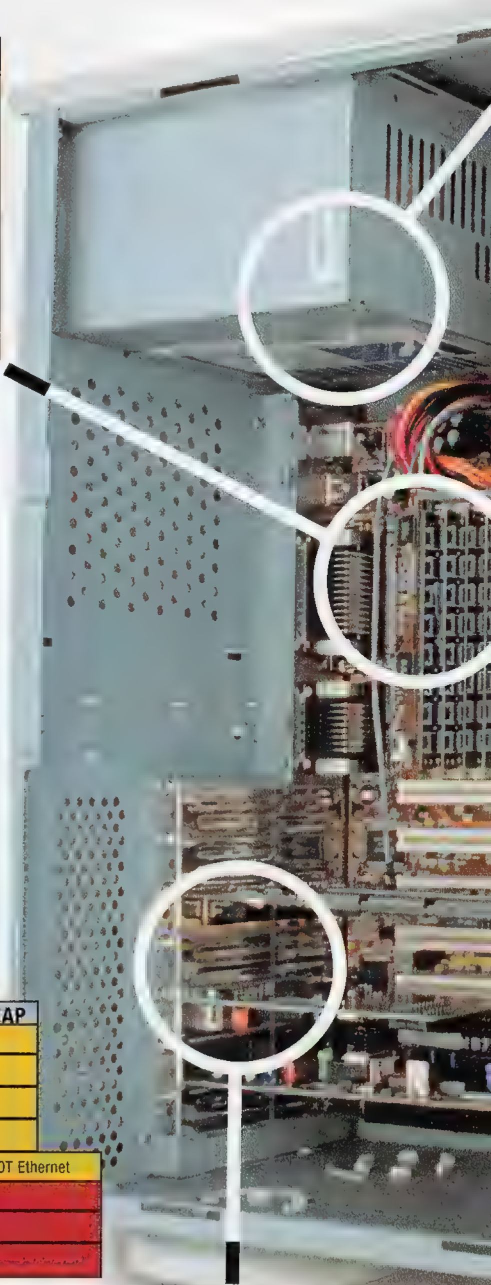
The NT workstation arena is no place for slouches—rendering time is serious money for the 3D-animating professional. Umax' first steps into the PC realm aren't perfect by any means—the less-than-stellar hard drive speeds and sub-par OpenGL performance offend us. But with some minor changes, Umax could have one mean machine in its family.

—Andrew Sanchez



FILLING THOSE SIMMS TO THE RIM

128MB of EDO-DRAM fill all four SIMM sockets, leaving the one DIMM free for any expansion. Choose your DIMM carefully–the motherboard maxes out at 384MB.



ALWAYS SOME TYPE OF JACK AWAY

Plug in an Ethernet connector or jack into your plain ol' telephone line—the Umaxstation 6400 is ready for either encounter.

EVERYTHING FOR EVERYONE

From here, plug in your speakers and USB peripherals—no blocked expansion slots for you this time out, thank God.

under the hood

THE BRAINS	
CPU	Intel Pentium II 266MHz
L2 CACHE	512K SBRAM (internal)
RAM	128MB EDO-DRAM (384MB max)
Motherboard	Asus KN97-x 440FX ATX formfactor
THE BRAWN	
Video	ELSA Gloria-L with 8MB VRAM & 8MB DRAM for texture memory
Hard Drive	Western Digital's Caviar AC34000 4GB EIDE hard drive
CD-ROM	Panasonic CR-585 24x EIDE CD-ROM
Expansion Bus	4 PCI, 3 ISA, 1 PCI/ISA shared
Fax/Modem	Etek 56K Data/Fax modem (Rockwell chipset)
LAN	Umax 10/100TX PCI Ethernet Card (3Com chipset)
I/O Ports	two serial, one parallel, two USB
THE BEAUTY	
Display	Hitachi CM-751U model 19"
Sound	Creative Labs Vibra 16 (integrated on motherboard)
Speakers	Yamaha YST-M25 3-piece subwoofer/satellite speakers and earphones
Other	OEM two-button PS/2 mouse, Iomega Zip drive

EXPANSION MAP

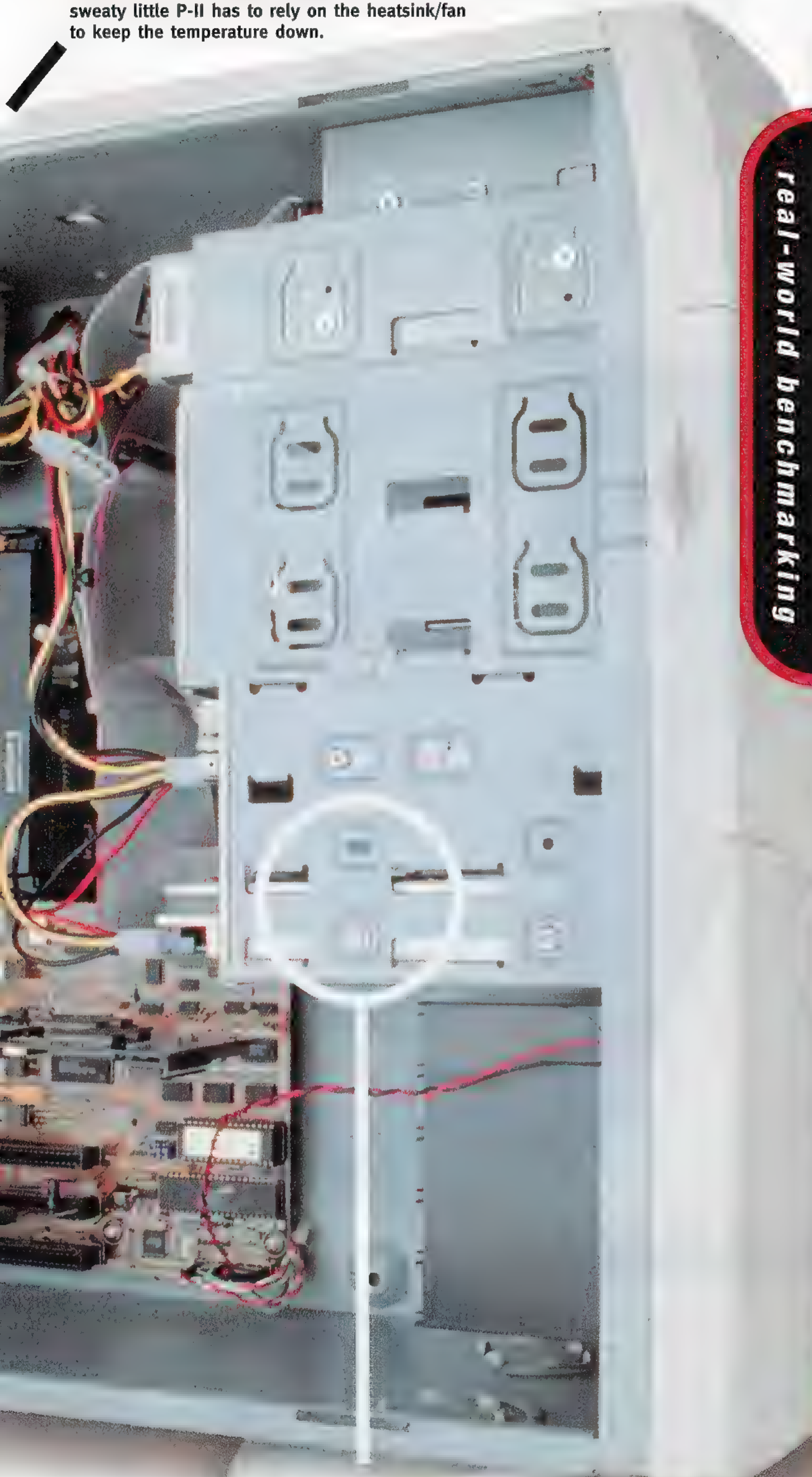
PCI	Video card
PCI	Free
PCI	Free
PCI	Free
PCI	Shared/10/100T Ethernet
ISA	Shared
ISA	Modem
ISA	Free

THE BUNDLE Windows NT 4.0 | Adobe PhotoDeluxe Adobe PageMill 2.0 & TypeManager | Lotus SmartSuites

boot	*down*
1:24	:07

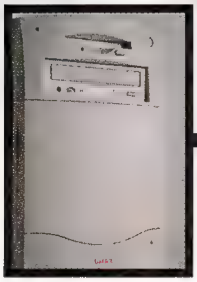
BURNIN' UP FOR YOUR LOVE

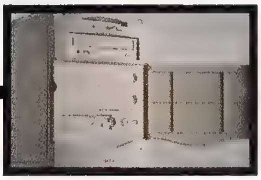
With no ATX power supply cooling the CPU, that sweaty little P-II has to rely on the heatsink/fan to keep the temperature down.



AT WHAT PRICE?

Beefy drive bays dot the interior landscape, but your two top-most PCI slots pay the full-sized price.

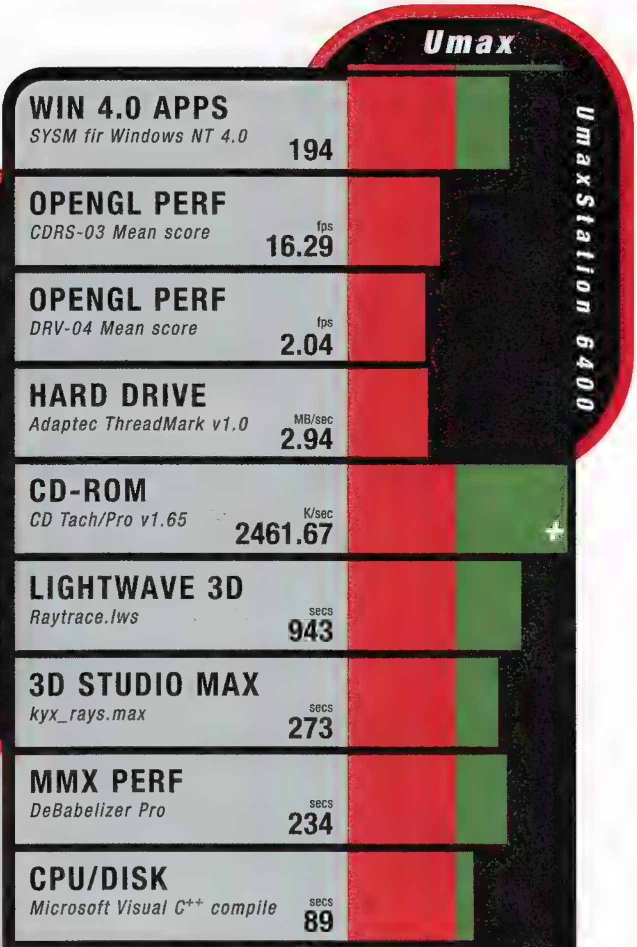




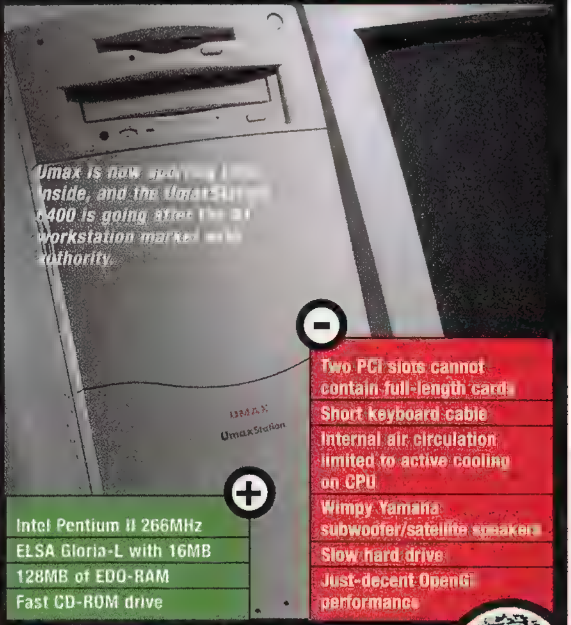
WHO'S AFRAID OF THE BIG BEIGE DOOR?

Behind this beige door lurks everyone's favorite Zip drive, as well as two spare 5.25" drive bays. DVD-ROM? DVD-RAM? Choose your storage pleasure.

real-world benchmarking



Benchmark	Test	Unit	Score
WIN 4.0 APPS	SYSM fir Windows NT 4.0		194
OPENGL PERF	CDRS-03 Mean score	fps	16.29
OPENGL PERF	DRV-04 Mean score	fps	2.04
HARD DRIVE	Adaptec ThreadMark v1.0	MB/sec	2.94
CD-ROM	CD Tach/Pro v1.65	K/sec	2461.67
LIGHTWAVE 3D	Raytrace.lws	secs	943
3D STUDIO MAX	kyx_rays.max	secs	273
MMX PERF	DeBabelizer Pro	secs	234
CPU/DISK	Microsoft Visual C++ compile	secs	89



Umax is now sporting [illegible] inside, and the UmaxStation 6400 is going after the [illegible] workstation market with authority.

+

- Intel Pentium II 266MHz
- ELSA Gloria-L with 16MB
- 128MB of EDO-RAM
- Fast CD-ROM drive

−

- Two PCI slots cannot contain full-length cards
- Short keyboard cable
- Internal air circulation limited to active cooling on CPU
- Wimpy Yamaha subwoofer/satellite speakers
- Slow hard drive
- Just-decent OpenGl performance

Price $5,995
Company Umax
Phone 888.289.8629
URL www.umaxpc.com

boot verdict
6

A complete breakdown of benchmark results is available on the *bootNet*. Point your browser to www.bootnet.com

EXPERIENCE PAYS OFF: THE 3X ZOOM.

And we've had more than enough experience, 78 years to be exact, to make it all worthwhile. With an insistence on superior optics, an obsession with design and size, a never-ending search for the optimum in effortlessness as well as ergonomics, it's little wonder that Olympus has pushed the 35mm envelope as far as we have. And now all that know-how and wizardry has been poured into our D-600L digital camera. Yes, it looks like a 35mm and feels like a 35mm. And often acts like one, too.

The new 3x zoom lens is razor-sharp, seven element Olympus all glass aspherical, F2.8, autofocus, with macro. The equivalent 35mm zoom focal length: 36mm to 110mm.

Some other distinctions: a mere 16.5 ounces in weight; center weighted metering as well as spot metering for difficult lighting conditions; dioptric viewfinder correction; +/- 3 step exposure correction; a four mode auto flash with red-eye reduction.

Your computer, our camera and bundled software. Now crop, enlarge, enhance, retouch, have fun.

MEGA PIXELS

Mega is an understatement. The CCD resolution on the D-600L is an astounding 1.4 million pixels, creating images at 1280 x 1024 pixel resolutions. Speaking of images, the D-600L uses a high-quality progressive scan CCD that captures the entire image in a single pass. Meaning you get what you should get: the highest-quality film-like images without any annoying ghosting or color bias traits that often appear in competitive sensor technologies.

D-600L
DIGITAL CAMERA

THE DIGITAL CAMERA REDEFINED.

Actual dimensions of the D-600L are 4.5" (w) x 3.25" (h) x 5.1" (d). So it's easy to carry around.

SHOOT TILL YOU DROP

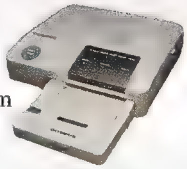
Shoot, shoot, shoot. There are absolutely no restrictions on the number of photos you capture with our camera. The removable 4 megabyte SmartMedia™ card gives you up to 49 standard quality images. Simply download the images from the card to your computer by means of the serial cable or the optional PCMCIA and 3.5" floppy disk adapters. Or you can insert a new SmartMedia card anytime and keep on shooting.

THE TTL IS VIP

A Very Important Part. It's a Through The Lens single lens reflex viewfinder so you're shooting photos as if you were looking through a 35mm SLR camera. Crisp, exact, infinitely superior images can be expected. In addition, there's a high definition LCD screen that you can use for reviewing, deleting or tagging images for printing.

A DIRECT CONNECTION

Finally, digital independence! Now you can connect the D-600L, or any Olympus digital camera, directly to our P-300 Personal Photo Printer. In just minutes you'll be able to print photo quality images directly from the camera.



Connect the camera to our P-300 printer and presto! Get the photo you want, when you want it.

A FEW NOTABLES

Note: our more affordable D-500L also has a 3X zoom lens with an equivalent 35mm focal length of 50mm to 150mm and a resolution of 1024 x 768.

Note: in the last year, Olympus digital cameras have won more awards than any other digital cameras. Journalists and industry experts are already hailing our new D-600L and D-500L as benchmarks in performance and design.

Note: you can see for yourself how rich and sharp the images from our digital camera really are. Just visit us at www.olympus.com. Or call us at 1-800-622-6372. We'll be pleased to answer all your questions.

OLYMPUS®

THE ART AND SCIENCE OF IMAGING™

OLYMPUS
1.4 Mega Pixels
Progressive CCD
3x ZOOM
ZOOM 9.2-28mm 1:2.8-3.9
JAPAN ø43mm
GLASS ASPHERICAL

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Product Information Number 260

Packard Bell **Multimedia** S615

Underachiever in the company of kings

The first Packard Bell that went through the bootLab got slapped around. Hard. But six-odd months can change a computer, and the Multimedia S615 that just ran our gauntlet is ready to rumble. Or so it would seem.

Borrowing the vertical sliding drive door from Sony's VAIO, the Multimedia S615's curvaceous cream-and-gray mini-tower case is an acquired taste.

Remove the two bottom screws and slide off the side panel (which is ribbed for your pleasure), and you'll discover that PB has finally chucked that funky-ass LPX formfactor that plagued earlier systems—this box boasts an 430TX-armed Packard Bell 790 ATX motherboard. But it sports only 256K of L2 cache! *Zoinks!* Twin DIMM sockets are ready for up to 256MB RAM, but one's currently occupied by a 32MB SDRAM DIMM. Inside the case, you get one free 3.5" drive bay and two free 5.25" drive bays. Maxtor's 85250 D6 EIDE hard drive handles 5.1GB.

Expansion slots consist of three PCI and three ISA slots. Curiously, the motherboard has the solder-points for a fourth PCI slot. The PCI slots that *are* realized are open thanks to the ATI 3D Rage II+ integrated on the motherboard. Unfortunately, you can't upgrade the 2MB SGRAM. The Aztech AT6800W modem/sound card combo takes up a solitary ISA slot. Installing full-length cards is a blockage-free affair.

The PB monitor's integrated speakers handle the tunes and tones, with 4W going to each satellite and 10W pushing a hidden subwoofer—although you'd be hard-pressed to believe these specs. This 17" monitor has an integrated microphone and on-screen controls. Adding to the multimedia mix is the keyboard, housing a whole bunch of squishy buttons for one-touch Internet access, volume control, and more.

System design shortcuts hurt the S615's performance. For a Pentium 233MHz MMX processor, the lack of 512K of L2 cache makes this dog perform like a stock P200, spewing out a 55.1 bootMark (Intergraph's TD-25 233MHz machine posted 61 and Xi's MX200 P200MMX machine delivered a 57). Win95 performance is also below average. But the Maxtor hard drive pushes some major megs per second, as does the zippy CD-ROM drive. That ATI comes to the rescue in DirectX performance, posting a solid 101 on the *MDK* PerfTest. But a mere 2MB of video RAM results in sloppy Direct3D visual performance, with TerraMarks exhibiting mondo dropped textures. Many D3D games require 4MB of video memory, so the S615 fails—big time. The Aztech's FM synthesis is as crappy as FM synth gets.

On the upside, ATI's 3D Rage II+ gives you VESA 2.0 compliance out-of-the-box as well as superior FMV quality, and the on-board VESA feature connector allows future ATI peripheral upgrades. But what's up with the single serial connector?

The Multimedia S615 has a plethora of useful touches here and there, but the designers took one too many shortcuts, and it hurt dearly in overall performance.

—Andrew Sanchez

under the hood

THE BRAINS

CPU	Intel P55C 233MHz MMX
L2 CACHE	256K pipeline burst (non-expandable)
RAM	32MB SDRAM DIMM (upgradable to 256MB)
Motherboard	Packard Bell 790 ATX motherboard (430TX)

THE BRAWN

Video	ATI 3D Rage II+ with 2MB of SGRAM (integrated onto motherboard), 1280x1024 @256 color max resolution
Hard Drive	Maxtor 85250 D6 5.1 EIDE
CD-ROM	Goldstar CRD-8240B 24x max EIDE CD-ROM
Expansion Bus	three PCI, three ISA
Fax/Modem	Aztech Sound Galaxy Sound4 56K x2
LAN	none
I/O Ports	one serial, one parallel, two USB

THE BEAUTY

Display	Packard Bell PnP 7480 17-inch monitor, .28mm dot-pitch, 1280x1024 max resolution
Sound	Aztech Sound Galaxy Sound4 ISA
Speakers	three piece subwoofer/satellite system integrated into Packard Bell PnP 7480
Other	Microsoft Intellimouse, multimedia keyboard

EXPANSION MAP

PCI	Free
PCI	Free
PCI	Free
ISA	Free
[illegible]	[illegible]
[illegible]	[illegible]

THE BUNDLE Microsoft Windows 95 OSR2.1 | Microsoft Greeting Workshop | CD Extra | G-Nome | The Great Math Adventure | Word Adventure | Microsoft Arcade | The Best Of Microsoft Entertainment Pack | Microsoft Money 97 | Intuit Quicken SE | MGI Photosuitie SE | Microsoft Works v4.0 for Win95 | Microsoft Word 97 | Microsoft Encarta 97 | Iris AntiVirus Plus | CyberWarne | | CyberCoach | Packard Bell Navigation Assistant | SystemWizard

boot	down
:54	:04

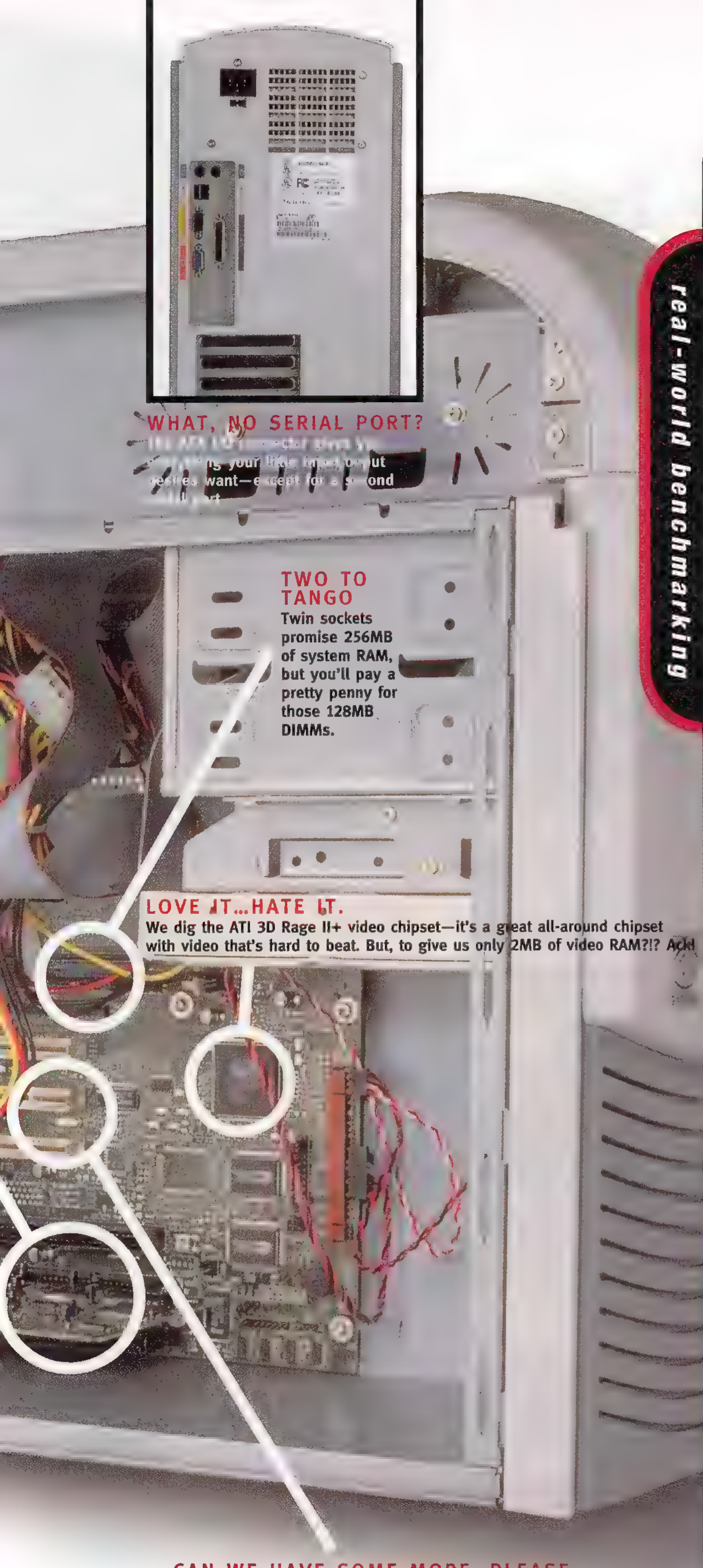
HAVEN'T WE SEEN THIS BEFORE?

While Sony doesn't have exclusive rights on the sliding door idea, it's interesting to see it make its way over to the S615. Behind this door lurks your power switch and all expansion bays.

Aztech's Sound Galaxy Sound4 combo does just about everything—modem, fax, answering machine, MIDI, and Sound Blaster digital sound. Do yourself a favor and make sure your Multimedia Control Panel's pointing to the wavetable synthesis—your ears will thank you.

WE'RE COOL, WE'RE COOL...

That ol' ATX formfactor, when combined with a fan/heatsink combo, keeps the CPU chilling out.



WHAT, NO SERIAL PORT?
[illegible] your [illegible] devices want—except for a second serial port.

TWO TO TANGO
Twin sockets promise 256MB of system RAM, but you'll pay a pretty penny for those 128MB DIMMs.

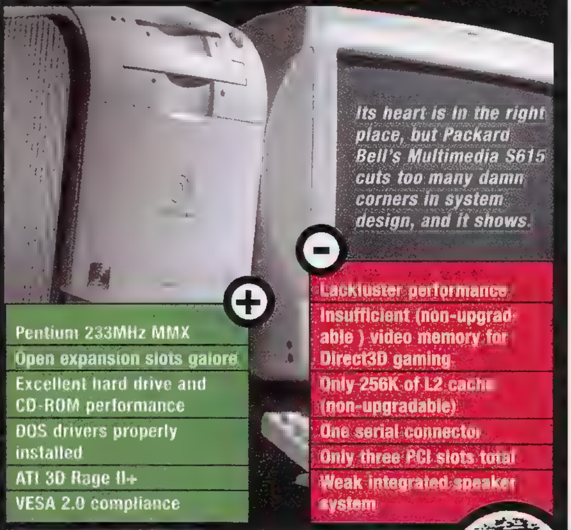
LOVE IT...HATE IT.
We dig the ATI 3D Rage II+ video chipset—it's a great all-around chipset with video that's hard to beat. But, to give us only 2MB of video RAM?!? Ack!

CAN WE HAVE SOME MORE, PLEASE.
Four PCI slots total is the bare minimum you should expect from a system—while all three of these bus-mastered babies are currently free, you'll fill these up real quick.

real-world benchmarking

Packard Bell
Multimedia S615

Test	Benchmark	Unit	Score
CPU/MOTHERBOARD	bootMark		55.4
WIN95 APPS	SYSmark32		167
DIRECT3D	Terramark	composite	398
HARD DRIVE	Adaptec ThreadMark v1.0	MB/sec	4.4
CD-ROM	CD Tach/Pro v1.65	K/sec	2496 +
WIN95 VIDEO	VidTach v1.52	% played	46.8
DOS GAMING	Quake v1.06	fps	13.8
DIRECTX GAMING	MDK PerfTest v1.4		101
MMX PROCESSING	DeBabelizer Pro	secs	318 +
CPU/DISK	Microsoft Visual C++ compile	secs	189



Its heart is in the right place, but Packard Bell's Multimedia S615 cuts too many damn corners in system design, and it shows.

+
- Pentium 233MHz MMX
- Open expansion slots galore
- Excellent hard drive and CD-ROM performance
- DOS drivers properly installed
- ATI 3D Rage II+
- VESA 2.0 compliance

−
- Lackluster performance
- Insufficient (non-upgradable) video memory for Direct3D gaming
- Only 256K of L2 cache (non-upgradable)
- One serial connector
- Only three PCI slots total
- Weak integrated speaker system

Price $1,699, monitor is additional $599
Company Packard Bell
Phone 800.733.5858
URL www.packardbell.com

boot verdict 6

A complete breakdown of benchmark results is available on the *bootNet*. Point your browser to www.bootnet.com

Dash Rendar—protector of the innocent and polygon hero in Shadows Of The Empire.

Shadows Of The Empire

A little dash will do ya

Trying to shoehorn different genres into one package rarely works, and *Shadows of the Empire* is no exception.

In this 3D accelerator-only game, you are Dash Rendar, a mercenary with a heart of gold. Fighting your way through hordes of Imperial baddies reveals the game's N64 origins. It's a dodgy club sandwich of a pseudo-flight sim, third-person shooter, and rail shooter all wrapped up under the *Star Wars* license.

Under Direct3D, *Shadows'* texture-mapped polygons render smoothly enough, in both 640x480 and 800x600. Whether sitting in a snow-speeder's pilot seat gunning for AT-ATs, or running about an abandoned Rebel base, frame rates meander around a slippery 20+fps. The mid-res textures are clean enough, but texture seams are occasionally apparent. Also, there's no light sourcing—duck Dash into the darkened cavern, and you can still see him clear as day. Hell, we won't even mention the railroad sequence where you duck or jump bridges. But they go right through you if you take the hit on the chin.

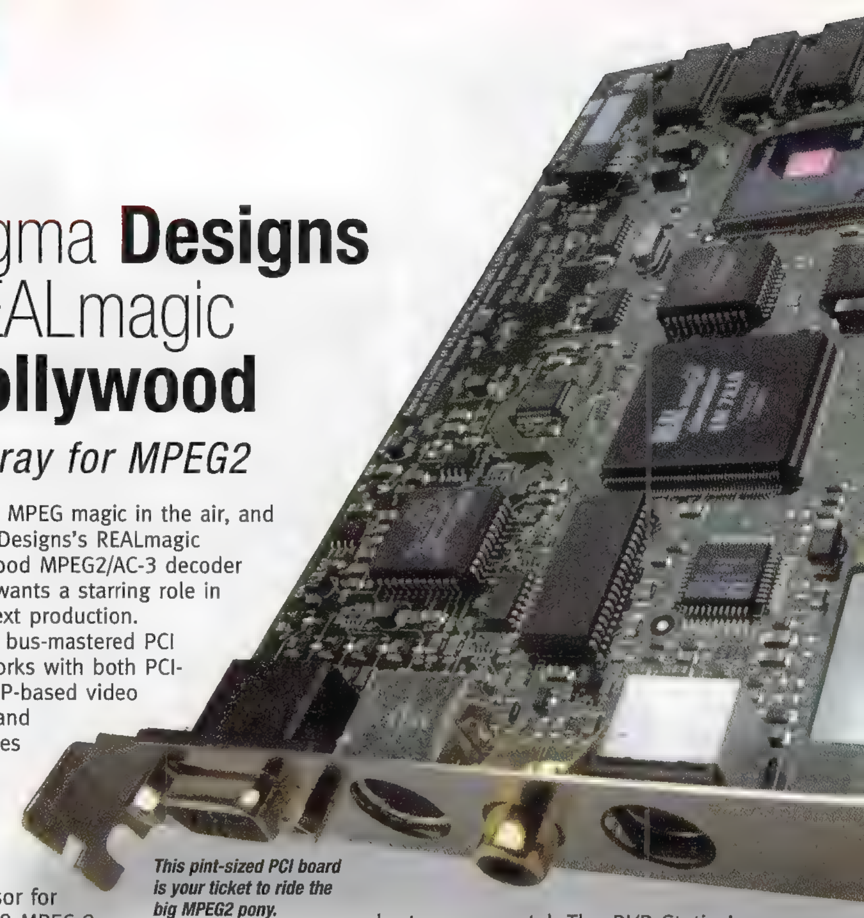
Force-feedback devices may wiggle in your hand when you're hit, but you'll find yourself jumping from joystick to keyboard when the game modes change.

Does the PC version outdo the N64? Yes. Is it worth getting? No. Despite all the lavish 3D and cinematics thrown at your hardware, not even John Williams' epic soundtrack can save *Shadows* from uneventful action and a confused gaming engine.

—Andrew Sanchez

Price $43
Developer/Publisher LucasArts
Phone 888.532.4263
URL www.lucasarts.com

boot verdict 4



This pint-sized PCI board is your ticket to ride the big MPEG2 pony.

Sigma **Designs** REALmagic **Hollywood**

Hooray for MPEG2

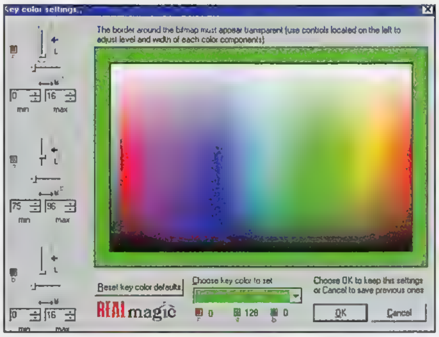
There's MPEG magic in the air, and Sigma Designs's REALmagic Hollywood MPEG2/AC-3 decoder board wants a starring role in your next production.

This bus-mastered PCI card works with both PCI- and AGP-based video cards, and combines a hardware-based IBM RISC processor for 720x480 MPEG-2 decoding. It also incorporates a hardware X-Y scalar for real-time window resizing and anti-aliasing all the way up to 1280x1024. Handled by the host CPU in software, Dolby Digital (AC-3) 5.1 is processed into two-channel Digital Pro Logic Surround, so audio outputs aren't necessary as sound pipes through your sound card. Unlike the Quadrant board reviewed in *boot* 10, the Hollywood uses a pass-thru cable for its video overlaying duties, while the RCA composite and S-Video DIN output make hooking up a TV simple. Having both outputs live comes in handy, especially if you have more than one TV. Naturally, S-Video gives you cleaner, brighter output than the washed-out composite.

In our tests, the card plugged and played uneventfully, levying a lone IRQ and one memory address as payment.

Sigma's *DVD Station* navigation toolbar, and its adjustment applet that controls overlay video color, brightness and contrast, are also included, but can be temperamental. The *DVD Station*'s color control is a plus, although the ability to save custom configurations for monitor and TV viewing would have been nice.

The actual performance of the Hollywood is among the best we've seen. Despite the onboard scalar, 800x600 is the optimal viewing resolution, with smooth edges and no shearing. Diagonal straight lines remain smooth, as do subtitles. The occasional jaggie popped up, but was barely noticeable, unlike viewing at full-screen 1280x1024, which strains the scalar into displaying ever-so-slight shearing and jagged edges.



Key color settings

The border around the bitmap must appear transparent (use controls located on the left to adjust level and width of each color components)

Choose key color to set

Choose OK to keep the settings or Cancel to save previous ones

Unlike Creative Lab's broken control panel, Sigma's elegant controls give you access to color saturation, contrast, and more.

The biggest quirk is that whenever you fast-forward or rewind, the audio and video fall horribly out-of-sync—only by restarting the movie does the problem go away.

Still, as free-standing MPEG2 decoder boards go, the Hollywood deserves at least an audition.

—Andrew Sanchez

Price $300
Company Sigma Designs
Phone 800.845.8086
URL www.sigmadesigns.com

boot verdict 7

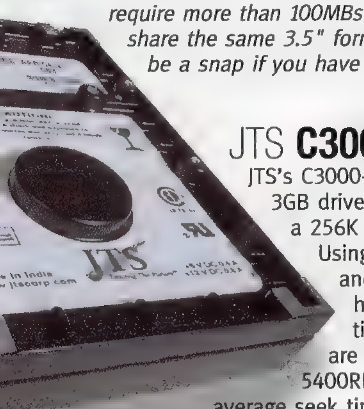
EIDE **Hard Drive** Ho-down

Mmm…storage

Hard drives—you can't live without 'em. But what do you do if you're motherboard doesn't support fast-and-fancy Ultra DMA?

Simple. You get one of these three new EIDE hard drives, each primed and ready for all those illicit storage needs, not to mention the cool new CD-ROM games that require more than 100MBs for their "recommended" install. All these drives share the same 3.5" formfactor, so installation of these pretty thangs should be a snap if you have the spare drive bay and free EIDE channel.

— Andrew Sanchez



It's the cheapest of the bunch, but substandard performance makes the JTS C3000-3AF a drive to avoid.

JTS **C3000-3AF**

JTS's C3000-3AF is a 3GB drive armed with a 256K buffer.

Using three disks and six data heads, rotation speeds are spec'ed at 5400RPM, while average seek times are quoted as "less than 12ms." The drive is unusual in that a metal plate covers the top area where the controller chip and other electronics are located.

A single partitioned hard drive gives you 2.78GB, and JTS's three-year warranty should cover any disasters you may encounter.

Under intense scrutiny, the C3000-3AF fails to deliver impressive results, winning only one category in this shootout. Access times clocked in at a sluggish 18.3ms—a far cry from "less than 12ms." Burst speeds were the slowest of the three hard drives tested. While the drive's Threadmark transfer rates pushed it well past the Micropolis drive, the C3000-3AF generally remained in the cellar during benchmarking

Overall, the drive's performance isn't up to snuff, the low price notwithstanding.

Price $197
Company JTS
Phone 408.468.1800
URL www.jtscorp.com

boot verdict 5

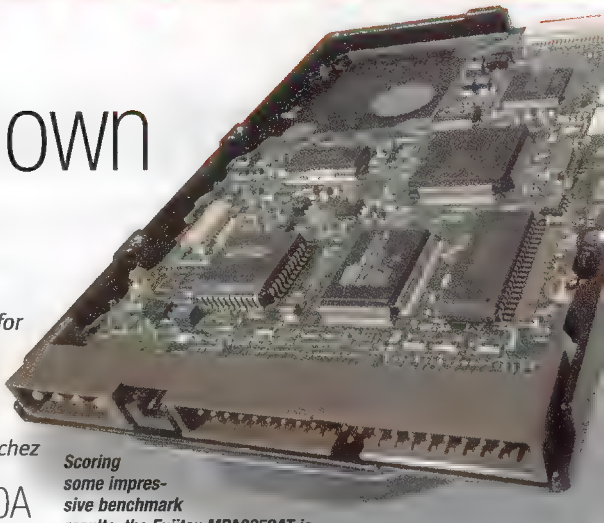
Micropolis **Mustang** 4550A

Micropolis' latest 5GB hard drive sports a 256K buffer, supports DMA modes, and complies with Self-Monitoring Analysis and Reporting Technology (SMART). Average seek times are spec'ed at 10.5ms, while rotational speeds clock in at 5200 RPM. The four-disk, eight-head drive formats to a 4.63GB hard drive. The Mustang straps a slew of new technologies, such as WriteNow (which allows the drive to queue up to four random write commands), independent execution from the host, and a deep prefetch algorithm that stores more data in cache. Throw in multiple independent buffer segments (so the cache is never overwritten by write data on the way to the disc), and you've got a champ, right?

Wrong. No amount of new fandango technology can hide from benchmarking, and the Mustang 4550A performed just OK. Its Norton Logical Cache Read score was disappointing, as was the dismally poor Threadmark score, suggesting the drive will gasp during real-world thrashing.

Price $320
Company Micropolis
Phone 800.395.3748
URL www.micropolis.com

boot verdict 7



Scoring some impressive benchmark results, the Fujitsu MPA3052AT is a serious contender for your storage needs.

Fujitsu **MPA3052AT**

Fujitsu's newest hard drive, the MPA3052AT 5.25GB, is the biggest one it makes. Sporting the smallest cache buffer of the group (128K), this drive sports a whopping 1.75GB per platter capacity, as well as the latest generation MR heads. With its three disks and six heads, the MPA3052AT formats to 4.86GB, and comes with a three-year warranty. This drive is also SMART compliant.

Under the benchmarks, the MPA3052AT proved to be the best of the bunch, posting an incredible 4.62MB/s data transfer rate under Threadmark (faster than many system hard drives). Access speeds barely squeezed by the Micropolis, while average speeds under HD Tach were also the best of the shootout. It's fast and furious, so if you're in the market for a hard drive, the Fujitsu MPA3052AT is a strong contender.

Price $349
Company Fujitsu COmputer Products
Phone 800.432.6333
URL www.fcpa.com

boot verdict 8

Dare To Compare

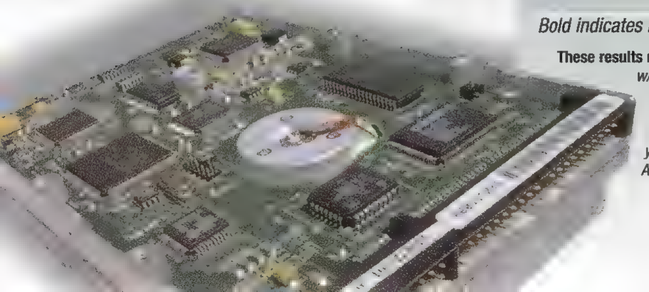
Benchmark		JTS C3000-3AF	Micropolis Mustang 4550A	Fujitsu MPA3052AT
Norton SI 2.0	Logical Cache Reads	53.9MB/s	50.6MB/s	51.8MB/s
	Logical Cache Writes	57.2MB/s	61.9MB/s	62.2MB/s
HD Tach v1.6	Access Time	18.3ms	16.7ms	16.6ms
	Burst Speeds	2.44MB/s	11.82MB/s	9.9MB/s
	Average Speeds	5.49MB/s	5.56MB/s	7.00MB/s
Adaptec Threadmark 1.0	Data Transfer Rate	3.60MB/s	3.14MB/s	4.62MB/s
	CPU Utilization	13%	11%	15%

Bold indicates best score

These results reflect the following system configuration: *CPU: Pentium II 233MHz; Motherboard: ASUStek P2L197; 440LX AGPset w/Intel bus-mastering drivers; Memory: 32MB DIMM; OS: Windows 95 OSR2.1 build 1212*

Benchmark results were taken with DMA enabled. Drives were formatted in FAT32 for maximum capacity. Each benchmark tests a different aspect of a hard drive. Norton Utilities' system information hard drive benchmark (found on our own bootMark) tests the maximum drive throughput with cache enabled (the logical read and write speeds). HD Tach v1.6 gives you all the basic information, such as average access times, burst speeds, and average speeds across the entire hard drive. Adaptec's ever-pervasive Threadmark trashes a hard drive by simulating real-world, multi-threaded reads and writes.

Micropolis' Mustang 4550A trots at a leisurely pace, but Fujitsu's newest outpaced on almost every benchmark.



Hewlett-Packard Pavilion 8190

P-II, AGP, DVD? What a recovery!

HP's Pavilion line has redeemed itself since last year when three upgrade-defying compromises sashayed into the bootLab. Those 7000 series systems claimed to push the vanguard, but bore access-blocking, proprietary LPX motherboards, gimpy onboard ViRGE decelerators, and only two PCI slots per box.

What a difference a year makes. The Pavilion 8190 is packed with plenty o' power parts, starting with a stock Intel Atlanta ATX motherboard. This little mamasita bears a 300MHz Pentium II, the 440LX core-logic set, three open PCI slots, and an AGP slot stuffed with ATI's Expert@Home. It's a configuration nearly beyond reproach: You get the fastest Intel processor, plenty of room to grow, and ATI's 3D Rage Pro chipset, the only AGP 2x incarnation currently shipping. Most significantly, the 4MB of AGP silicon is in a slot, not soldered to the board, so you can swap the video card with any other AGP part you so desire.

The 8190 bootMarked at a scary 145–equal to Dream Machine 97's score (the highest mark we've seen), and four points higher than this month's awesome Dell. Direct3D and DirectX gaming scores were fearsome too, but the Expert@Home proved itself somewhat less studly than the Dell's STB Velocity 128 AGP card and its nVidia Riva 128 chipset. Yes, the HP's 832 Terramark and 126 PerfTest scores were fantastic, but an AGP-optimized version of *Incoming* ran faster on the Dell. This mostly speaks to differences in 3D chip architectures, the 3D Rage Pro's more advanced AGP implementation notwithstanding. Still, the Rage Pro *does* claim superior MPEG1 video playback and D3D visual quality.

The HP ran our *Quake* benchmark at 14fps. However, when we optimized the system with *FastVid*—the same P-II/P-Pro video-enhancing utility that helped the DreamMachine reach 22.4fps—the 8190 coughed up 25fps. Chart-busting CD-Tach scores are always nice, but prove especially pleasing when yielded by a second-gen Hitachi DVD-ROM drive. Surprisingly capable software handles MPEG2 decoding; try as we might we couldn't find dropped frames, out-of-sync audio, or shearing. Hard drive performance was hardly bootWorthy—dig the disturbing C++ compile score—but at least that Quantum Cyclone offers 6GB of storage.

While the Pavilion series has made great strides, it isn't quite kicking ass yet. A few too many benchmarks fell below spectacular, and the proprietary HP sound card emitted hokey hardware wavetable. And while you can certainly upgrade to a PCI sound card in one of those open slots, you'll first have to open a veritable chastity belt of a case that's cinched up with screws a-plenty and interlocking panels. At least once you get inside, the motherboard is splayed open for accessible parts picking.

To enter the land of kick-ass excess, the 8190 needs another 32MB of memory, a faster hard drive, and enough tweakage to hit major greenage in every benchmark. Nonetheless, the 8190 is a fantastic machine with few serious rivals. The new Pavilion awaits your nimble adjustments.

—Jon Phillips

under the hood

THE BRAINS

CPU	Intel Pentium II 300MHz
L2 Cache	512K (internal)
RAM	32MB EDO-DRAM (192MB max)
Motherboard	Intel Atlanta 440LX, ATX formfactor

THE BRAWN

Video	ATI Expert@Home (3D Rage Pro AGP 2x chipset); 4MB expandable to 8MB
Hard Drive	Quantum Cyclone 6GB EIDE
DVD-ROM	Hitachi GD-2000 (second-gen)
Expansion Bus	One AGP, three PCI, one shared PCI/ISA
Fax/Modem	56Kbps Hayes Compatible (K56flex)
I/O Ports	Two USB, one parallel, two serial, one game/MIDI, NTSC video out

THE BEAUTY

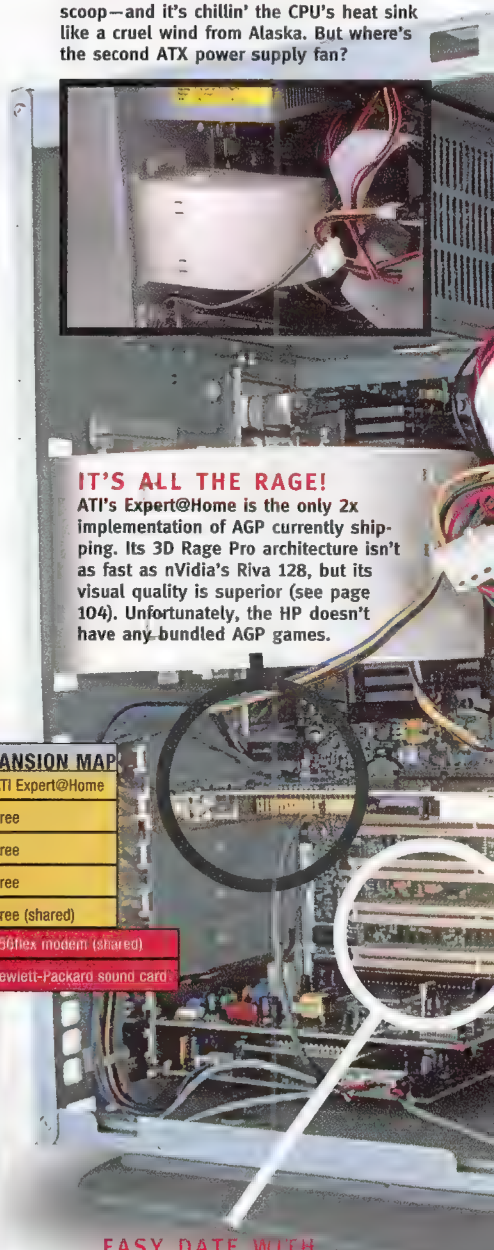
Display	Optional 17" HP Pavilion Multimedia Display; invar shadow mask; 0.28mm dot pitch; 1280x1024/70Hz max
Sound	Analog Devices 18Max10 chipset with FM synth and hardware wavetable; 1MB samples in ROM
Speakers	Polk Audio satellite/subwoofer combo
Other	One-touch keyboard with volume knob and four programmable buttons

EXPANSION MAP

AGP	ATI Expert@Home
PCI	Free
PCI	Free
PCI	Free
PCI	Free (shared)
ISA	K56flex modem (shared)
ISA	Hewlett-Packard sound card

THE BUNDLE Microsoft Windows 95 | Microsoft Works Synchro Connect | VideoPhone | Quicken SE | HP Financial Calculator | Microsoft Picture It! | Kai's Power Goo EasyPhoto | Compton's Interactive Encyclopedia 97 | Nile: Passage to Egyp | Oregon Trai | Reader Rabbit 2 | Ultimate Writing & Creativity Center | Operation Neptune | Universe According to Virgil Reality | MechWarrior 2 Mercenaries SimCity 2000 | HP Pavilion Media Rack | WaveCube Hollywood Studios Vol. 1 Sampler (DVD/AGP) | Connections (DVD/AGP) | PowerFinder USA (DVD)

boot	down
1:13	:11



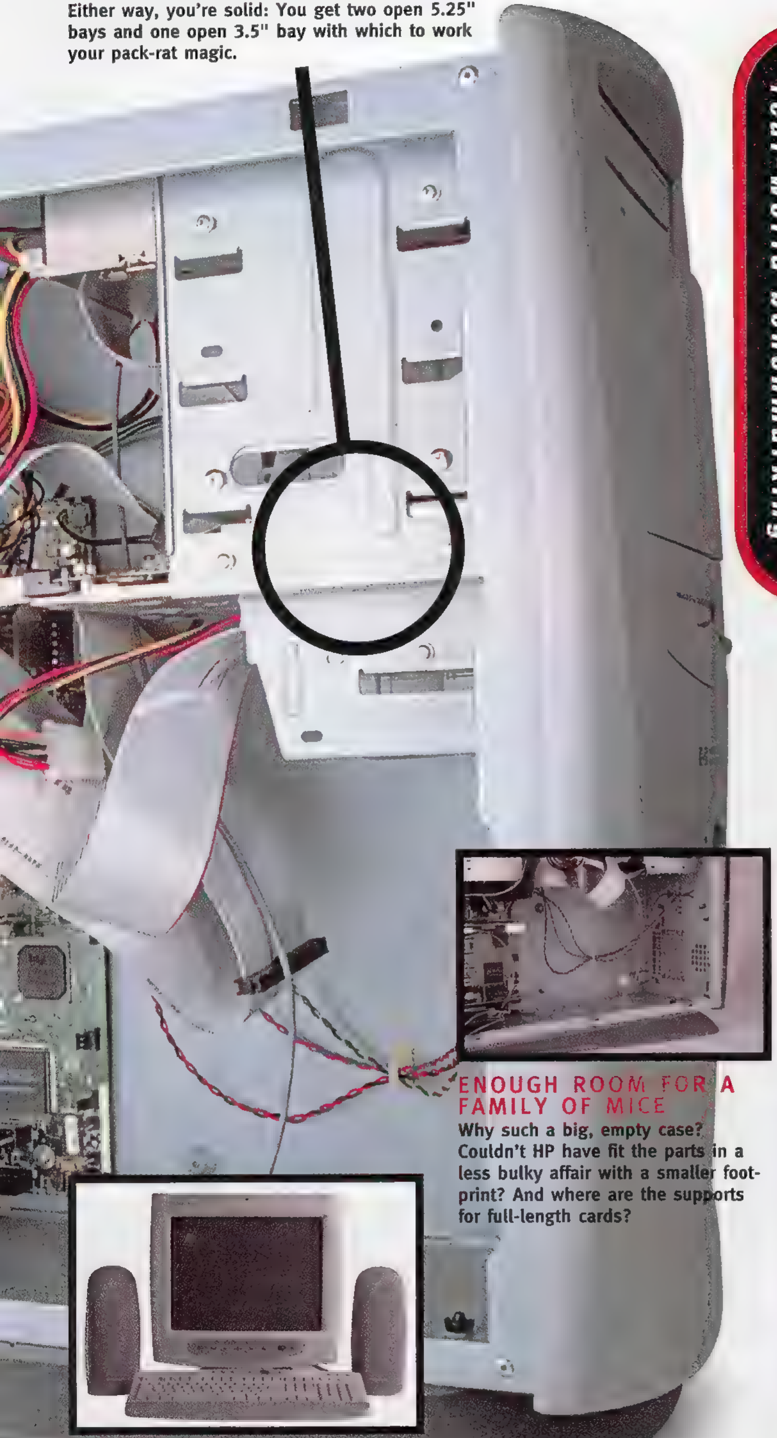
BLOW ME DOWN!
There's a fan stuck in that there hood scoop—and it's chillin' the CPU's heat sink like a cruel wind from Alaska. But where's the second ATX power supply fan?

IT'S ALL THE RAGE!
ATI's Expert@Home is the only 2x implementation of AGP currently shipping. Its 3D Rage Pro architecture isn't as fast as nVidia's Riva 128, but its visual quality is superior (see page 104). Unfortunately, the HP doesn't have any bundled AGP games.

EASY DATE WITH DESTINY
No more parts blockage or funky riser boards! The new Pavilion's Intel Atlanta ATX is sitting unabashedly exposed and ready for a three-way—that's three PCI slots waiting for some lovin'.

SAVING FOR RAINY DAY

Are you a storage nut, or simply storing nuts? Either way, you're solid: You get two open 5.25" bays and one open 3.5" bay with which to work your pack-rat magic.



ENOUGH ROOM FOR A FAMILY OF MICE

Why such a big, empty case? Couldn't HP have fit the parts in a less bulky affair with a smaller footprint? And where are the supports for full-length cards?

WAVY A[illegible]

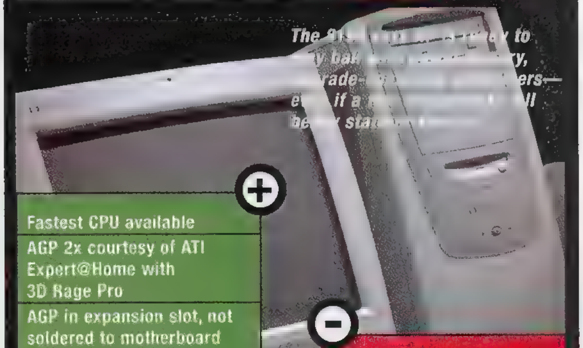
For another $699, you can buy HP's 17" monitor. Don't. Its refresh rate tops out at 70KHz, and 19" displays are fast becoming affordable. But the one-touch keyboard rocks (you can program it to launch apps), and the Polk Audio speakers are nice for stock pack-ins, especially the active subwoofer (not pictured here)

Hewlett-Packard

Pavillion 8190

real-world benchmarking

CPU/MOTHERBOARD	*bootMark*	145
WIN95 APPS	*SYSmark32*	220
DIRECT3D	*Terramark*	832
HARD DRIVE	*Adaptec ThreadMark v1.0*	MB/sec 2.7
CD-ROM	*CD Tach/Pro v1.65*	K/sec 2105
WIN95 VIDEO	*VidTach v1.52*	% played 61
DOS GAMING	*Quake v1.06*	fps 14
DIRECTX GAMING	*MDK PerfTest v1.4*	126
MMX PROCESSING	*DeBabelizer Pro*	secs 224
CPU/DISK	*Microsoft Visual C++ compile*	secs 207



The 81[illegible] to [illegible]y bat[illegible]y, [illegible]rade-[illegible]ers— e[illegible] if a [illegible]ll be[illegible]y sta[illegible]

+

- Fastest CPU available
- AGP 2x courtesy of ATI Expert@Home with 3D Rage Pro
- AGP in expansion slot, not soldered to motherboard
- Three open PCI slots
- DVD-ROM drive with stellar MPEG2 software decoding
- Boffo DirectX and MMX performance
- "One-touch" keyboard launches favorite apps

−

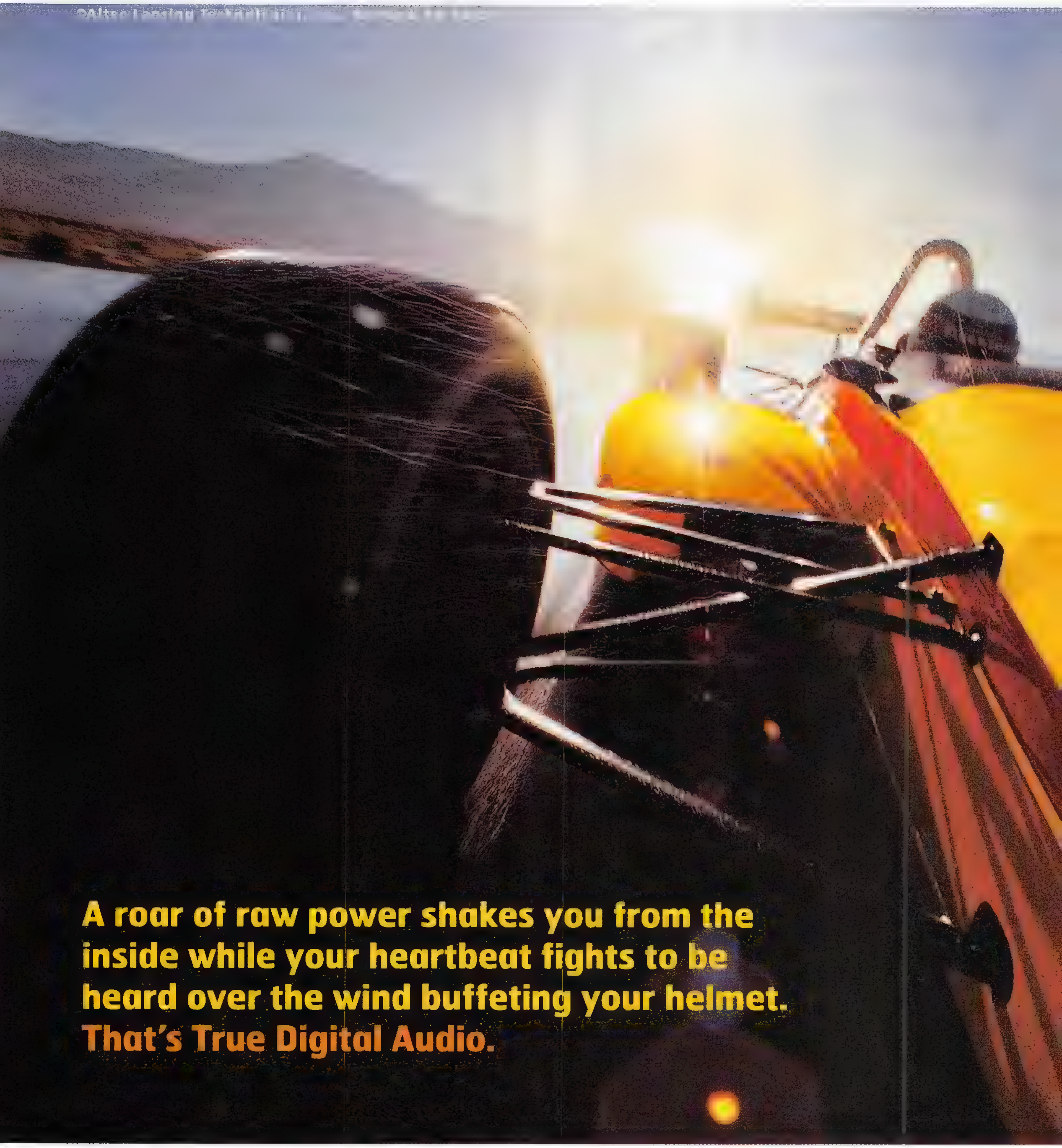
- Hard disk performance slogs
- Has-been sound technology
- Distressing C++ compiling performance
- No supports for full-length cards

Price $2,999;
$3,698 w/ monitor
Company Hewlett-Packard
Phone 800.724.6631
URL www.hp.com

boot verdict
9

A complete breakdown of benchmark results is available on the *bootNet*. Point your browser to www.bootnet.com

©Altec Lansing [illegible]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Product Information Number 83

Compaq Presario 1680

It's a pretty Gouda notebook

The Presario 1680 is the first Tillamook-equipped notebook to hit the bootLab, and like the carefully cultured cheese, the 1680 has a strong flavor that will tantalize your taste buds, even if it does have a few (gulp!) design holes.

So what's Tillamook? It's essentially the mobile equivalent of a desktop Pentium with MMX, but is produced with a smaller fabrication process (only .25 microns), and consumes less power than its desktop counterpart. It's also available in only two flavors: regular (200MHz) and extra-spicy (233MHz). If you're holding out for a 266MHz Tillamook, don't bother. With Intel quickly abandoning its Socket 7 architecture, there won't be anything faster until mobile Deschutes is released in mid-1998.

But still, with 200MHz lurking inside, performance has got to be good, right? Well, while many bootMarks landed on or very near the green, there were some curdled results–and components. The 20x Sanyo CD-ROM drive had an average transfer rate of half that of the 20x Toshiba drive included with the lowly Presario 1620 model (see sidebar). The hard drive also posted slightly sour results. The 2.08MB/s transfer rate was an underachiever, ultimately contributing to the underwhelming compile time in Microsoft C++, even with the infinitely cooler 32MB of integrated SDRAM.

The 12.1" screen churned out vivid colors (at least when viewed head-on) and exhibited virtually zero flex. But what's up with the 800x600 maximum resolution? 1024x768 is pretty much status quo these days.

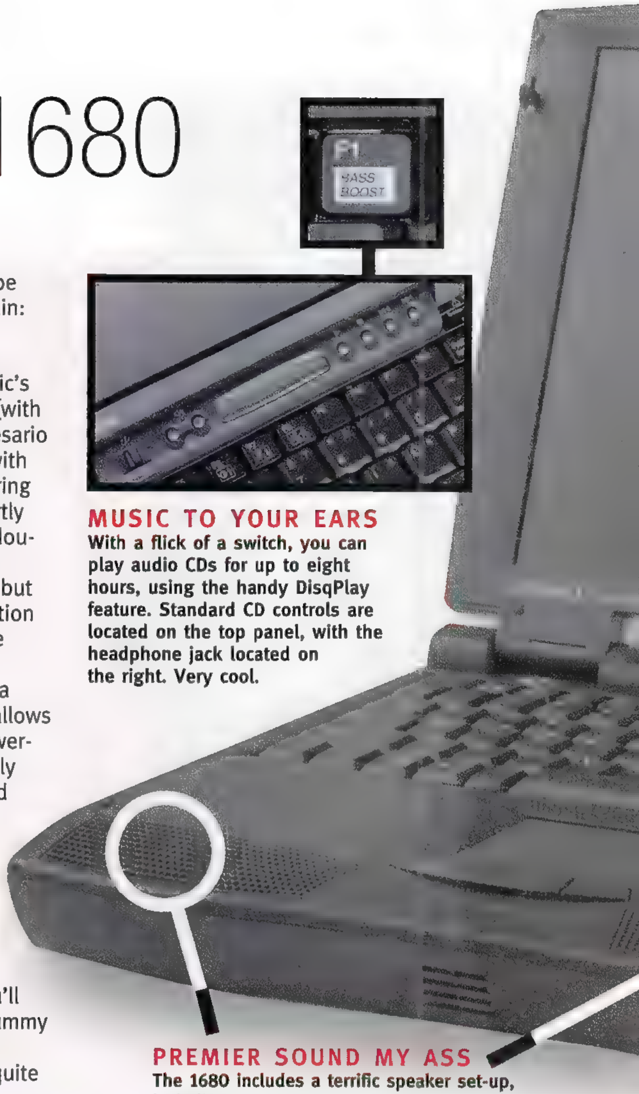
Compaq gets bonus points for including a killer speaker system (featuring ported bass-reflex enclosures, 10-stage equalization, and even a dynamic bass boost), but why go to all the trouble if you're going to throw in a hellish FM synth engine? We've harped on this many times before, but since Compaq engineers don't seem to be getting the message, here it is again: FM is dead. Get over it.

The video subsystem is great. Making use once again of NeoMagic's terrific MagicGraph 128XD chipset (with 2MB of EDO DRAM), this latest Presario handled MPEG and AVI playback with equal aplomb. Ghosting and flickering were mildly apparent, but not overtly so, with frame rates nicely in the double-digits. Fraggers won't complain about the 14.5fps in SVGA *Quake*, but you won't be able to watch the action on the big screen: TV-out ports are sadly not included.

The Presario 1680 incorporates a cool feature called DisqPlay. This allows you to play audio CDs without powering up the machine. Separate, easily accessible buttons mounted around the LCD control standard CD operations, even when the lid is closed. Other treats include dual USB ports, an integrated 56.6Kbps modem, and simultaneously accessible CD-ROM and floppy drives. Tasty.

When all is said and done, you'll find the Presario 1680 is mighty yummy for your tummy. However, heartier eaters may find the 1680 doesn't quite cut the Muenster.

—Bryan Del Rizzo



MUSIC TO YOUR EARS
With a flick of a switch, you can play audio CDs for up to eight hours, using the handy DisqPlay feature. Standard CD controls are located on the top panel, with the headphone jack located on the right. Very cool.

PREMIER SOUND MY ASS
The 1680 includes a terrific speaker set-up, including ported bass ports—but who wants to hear lousy FM-audio. Certainly not *boot*.

under the hood

REAL-WORLD BATTERY LIFE 02:28:00

THE BRAINS

CPU	Intel 200MHz Tillamook Pentium with MMX
L2 Cache	256K pipelined burst
RAM	32MB EDO DRAM (96 maximum)
Video	NeoMagic MagicGraph 128XD (2MB EDO DRAM)

THE BRAWN

Hard Drive	Various 2.1GB
CD-ROM	Toshiba 20x
Expansion Bus	Two Type II; One Type III; CardBus- and Zoomed-Video-compatible
I/O Ports	One monitor, one PS/2, one serial, two USB ports
Lap Weight	7 pounds, 8 ounces
Carrying Weight	8 pounds, 8 ounces

THE BEAUTY

Display	12.1" active-matrix screen
Sound	ESS 1887 FM synth
Video	800x600, 24-bit color
Speakers	Stereo speakers; 2W per channel
Communication	Built-in Compaq K56 56.6Kbps modem

THE BUNDLE LapLink I Microsoft Money I Microsoft Works I Sim City 2000 Network Edition Online Services Change

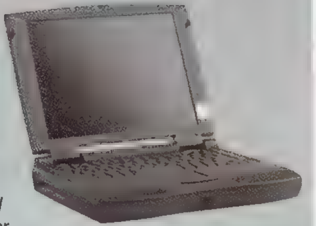
boot :57 *down* :05

CD-ENVY

The 1620's Toshiba CD-ROM drive was twice as fast as the 1680's Sanyo drive. Compaq claims both are 20x drives, but the Sanyo performed more like a 5x. Sanyo claims the drive speed is automatically reduced to the equivalent of a 4x or 5x whenever a mixed-mode CD is detected. But since our benchmark CD is a pure data disc, we'd bet the performance has to do more with the quality of the drive itself. A problem with poorly manufactured CAV 20x drives is that the platter doesn't spin evenly on the outer tracks (the part of the disc that is spinning the fastest), resulting in error compensation, a slower disc spin, and a poorly read disc. Drive mechanics and error compensating firmware are key to a good drive, both of which are sadly missing from the Sanyo. But because Compaq uses both Toshiba and Sanyo drives in the 1680, you won't know which one you're getting until you bring it home and spin it up.

Compaq Presario 1620

Not So Gouda



The 1620 and the 1680 arrived like conjoined twins, but after our first round of benchmarks, we were ready to sever the relationship. Big-time. Big-time.

The 1620–to put it mildly–is absolutely insufferable. Performance issues notwithstanding, the biggest consternation is the pathetic, 12.1" STN display. Screen images appeared and disappeared slowly whenever we tried to open or close an application, leaving residue trails that seemingly hung in mid-air. Hell, after only a few minutes of use, the ghosting effect resulted in eye-strain and major headaches, and we can't even begin to imagine the horror of having to use this on a daily basis. Screw the cash. Give us a TFT display pronto.

And as for performance, there really wasn't any--even with a genuine mobile Pentium 166MHz with MMX. The bootMarks speak for themselves, but it should be noted that nothing's wrong with the chip itself. It just happens to be surrounded by a lousy implementation of components and drivers. How else can you explain the major differences in video performance, when both the 1620 and 1680 possess identical subsystem components?

If you find the 1620's $2,999 price attractive, you'd be wise to check out other alternatives. Or better yet, save your cash for the Presario 1680.

The 1620 is the limburger of notebooks.

CPU/MOTHERBOARD	32.7
WIN95 APPS	82
DIRECT3D	N/A
HARD DRIVE	2.21
CD-ROM	2082
WIN95 VIDEO	63.4%
DOS GAMING	5.1
DIRECTX GAMING	52
MMX PROCESSING	450 seconds
CPU/DISK	551 seconds

boot :55 down :10

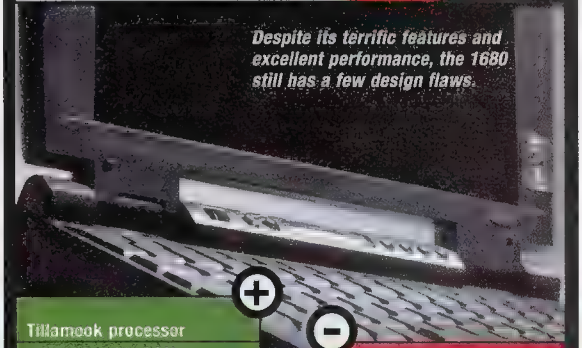
Price $2,999
Company Compaq
Phone 800.345.1518
URL www.compaq.com

boot verdict 1

Compaq Presario 1680

real-world benchmarking

Test	Benchmark	Unit	Score
CPU/MOTHERBOARD	*bootMark*		51.6
WIN95 APPS	*SYSmark32*		160
DIRECT3D	*Terramark*	composite	
HARD DRIVE	*Adaptec ThreadMark v1.0*	MB/sec	2.08
CD-ROM	*CD Tach/Pro v1.65*	K/sec	952
WIN95 VIDEO	*VidTach v1.52*	% played	93.7
DOS GAMING	*Quake v1.06*	fps	14.4
DIRECTX GAMING	*MDK PerfTest v1.4*		90
MMX PROCESSING	*DeBabelizer Pro*	secs	426
CPU/DISK	*Microsoft Visual C++ compile*	secs	244



Despite its terrific features and excellent performance, the 1680 still has a few design flaws.

+	−
Tillamook processor	No gameport
Integrated CD-ROM and floppy drive	No IrDA port
Video subsystem	No TV-out
USB ports	800x600 max display
Speaker system	Annoying sleep mode
DisqPlay feature	FM-audio crap
55.6Kbps modem	

Price $4,199
Company Compaq
Phone 800.345.1518
URL www.compaq.com

boot verdict 7

A complete breakdown of benchmark results is available on the *bootNet.* Point your browser to www.bootnet.com

"POSTAL IS ONE SICK PUPPY, AND I KINDA LIKE IT."
GamePower.Com

"ITS BLOODIER THAN MONOLITH'S BLOOD™ AND MORE EXPLOSIVE THAN ID'S QUAKE™!"
PC Multimedia & Entertainment Magazine

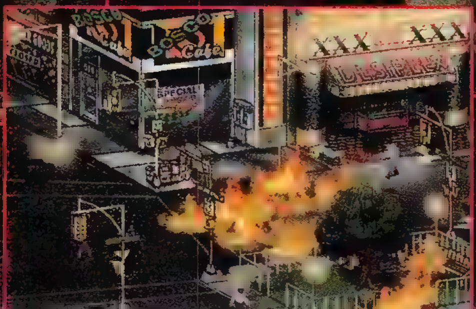
"ONE OF THE MOST POWERFUL GAME EDITORS WE'VE EVER SEEN IN AN ACTION GAME"
Computer Gaming World

"POSTAL IS ONE OF THE MOST OUTRAGEOUSLY FUNNY TITLES I'VE EVER SEEN! IN ADDITION TO THE GREAT GAME PLAY, THE TECHNICAL AND ARTISTIC FEATURES OF THIS GAME ARE EXCEPTIONAL."
AnyGame.com

"SURE, SENSELESS VIOLENCE IS FUN, BUT IT'S EVEN MORE FUN WHEN IT'S DIRECTED AT MARCHING BANDS"
Computer & Net Player Magazine

- Brutal shooter/strategy combo challenges you to keep one eye on your target and the other looking over your shoulder at all times.

- So freakin' real, your victims will actually beg for mercy and scream for their lives.



- Real-time 3D characters rage against beautifully hand-painted 2D killing fields.

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KickAss.com

"ANTISOCIAL, PSYCHOTIC AND COMPLETELY IRRESISTIBLE."
PC Games

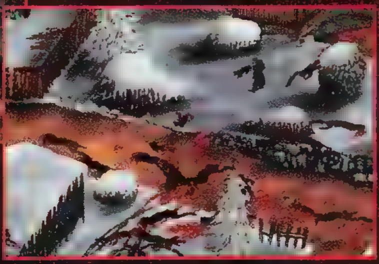
"THE SHOCK VALUE MIGHT GET YOU STARTED ON POSTAL, BUT IT'S THE GAMEPLAY THAT WILL KEEP YOU COMING BACK."
Gamepen

"THE GAME'S SOUND EFFECTS...ARE NUMEROUS AND ENTERTAINING..."
Gamesmania

TM

" POSTAL HAS REDEFINED WHAT ACTION GAMING IS ALL ABOUT, AND YOU'LL BE HEARING A LOT ABOUT THIS ONE FOR A LONG TIME TO COME. REVIEW SCORE: 10 OUT OF 10"
Winner of the Editor's Choice Award
EnterMedia.Net

- Mass murder opportunities: spray protesters, mow down marching bands and charbroil whole towns.



- Multi-player network play over modem, LAN, or the Internet – so you can go Postal with up to 15 near death row candidates.

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CONTENT RATED BY
ESRB

RUNNING WITH SCISSORS

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GAMES

Toshiba **Portégé** 300CT

Double-decker delight

The Portégé 300CT doesn't pack a fast processor, MMX, and 3D acceleration like today's newest notebooks, but don't dismiss it as a notebook wannabe. It may only have a Pentium 133MHz processor inside, but the Portégé proves that a subnotebook doesn't necessarily have to be bleeding-edge to be damn good.

And besides... it's cute.

Clearly, Portégé's biggest appeal is its size. With a carrying weight of just over three pounds and a 7"x10" footprint, the Portégé is just as comfortable to use on your desk as it is in your lap. And although the 10.4" display (with an unorthodox 1024x600 resolution) is decidedly smaller than most, visual clarity doesn't suffer at all. The active-matrix screen is bright as hell, with no noticeable color degradation. With a screen this small, you'd expect some flex, but it's kept to a minimum. Unfortunately, you'll have to sit directly in front of the screen to see anything. Off-axis viewing is nonexistent.

Unlike the Libretto 50CT, its stillborn baby brother reviewed in *boot* 13, the Portégé includes an ample-sized, functional keyboard and track-point.

A closer inspection even reveals a few hidden gems: an integrated 33.6Kbps fax/modem, software wavetable, a single USB port (hidden behind a tiny sliding door), two PC card slots (Zoomed Video- and CardBus-compatible), and an external volume control. Not bad for a machine half the size of a regular notebook.

Enticing as this sounds, there *is* a catch: A CD-ROM drive isn't included (although an external floppy drive is).

Before you get your knickers in a knot, let us explain. Although it's not integrated into the base unit, the 10x CD-ROM drive (along with a host of other features) is integrated into the optional port-replicator. For some this may be sacrilegious, but we'd call this a shrewd engineering move made with portability in mind. With a built-in modem and IrDA port, the Portégé is the perfect size to take on the road, and you won't suffer from a sprained medial deltoid in the process. If you're really that concerned, you can still hook up a portable CD-ROM drive to one of the PC card slots, or install software through a network connection. Plus, the double-decker design is very cool. About the only thing missing is an English bobby!

As stated, the port replicator is replete with features, including dual PS/2 ports, another USB port, audio connections, and two stereo speakers. But be forewarned: Carry the entire kit and kaboodle around, and the overall weight jumps to just over seven pounds.

As evidenced by the bootMarks, the Portégé falls (for the most part) squarely in the red. However, considering the benchmarks are based on a Pentium 166MHz, the redlining performance is actually quite good. Standouts include DirectX gaming (which was on par with a 166MHz-equipped machine) and the CD-ROM performance (transfer rates were zippy, although the drive did eat up 61% of the CPU in the process).

And while fraggers will be disappointed with the meager 10.8fps at 640x480, you can still play a mean game of VGA *Quake*—at a speedy 27.8fps to be exact.

When all is said and done, the Portégé is one of those rarities striking a perfect balance between portability and functionality.

—Bryan Del Rizzo

under the hood

REAL-WORLD BATTERY LIFE 01:35:00

THE BRAINS

CPU	Intel Pentium 133MHz
L2 Cache	256K pipelined burst
RAM	32MB EDO DRAM (64MB maximum)
Video	Chips and Technologies HiQVideo 65554 (2MB EDO DRAM)

THE BRAWN

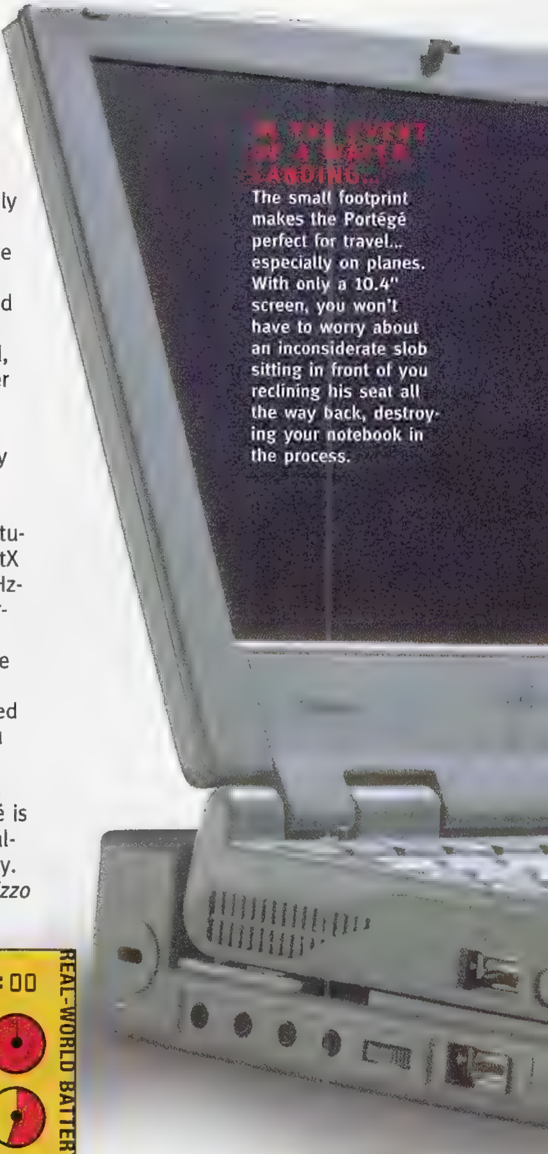
Hard Drive	IBM 1.5GB
CD-ROM	10x (on port-replicator only)
Expansion Bus	Two Type II; one Type III; CardBus- and Zoomed-Video-compatible
I/O Ports	On base unit: one monitor and USB port; on port replicator: dual PS/2, one parallel, one serial, one monitor, and one USB port
Lap Weight	3 pounds, 13 ounces
Carrying Weight	7 pounds, 6 ounces

THE BEAUTY

Display	10.4-inch active-matrix screen
Sound	OPL3-SA3 FM-synth with software wavetable
Video	1024x600, 16-bit color
Speakers	On base unit: one speaker; on port replicator: stereo speakers
Communication	Built-in Toshiba 33.6Kbps Data/Fax/Modem, IrDA port

THE BUNDLE Syncro Multimedia Connect | Mediamatics Arcade Pak | Sony Music Screeners | Netscape Navigator | Puma TranXit | Video for Windows | Intel Indeo Video | Online Services

boot	*down*
:56	:06



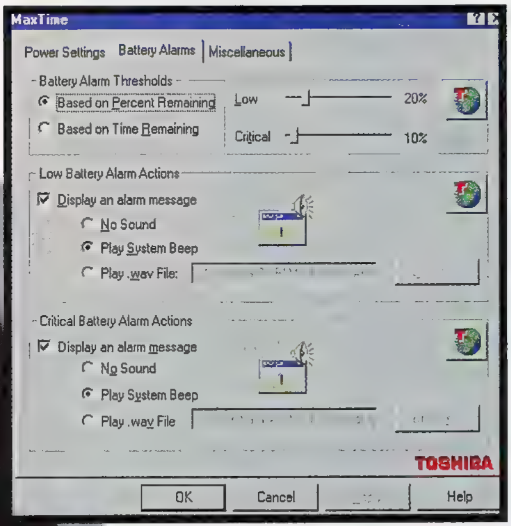
IN THE EVENT OF A WATER LANDING... The small footprint makes the Portégé perfect for travel... especially on planes. With only a 10.4" screen, you won't have to worry about an inconsiderate slob sitting in front of you reclining his seat all the way back, destroying your notebook in the process.

YOUR SEAT CUSHION CAN BE USED AS A FLOTATION DEVICE

The optional port replicator is replete with an assortment of useful connections including an additional USB port, audio controls, and stereo speakers.

SHOULD THE CABIN LOSE PRESSURE, AN OXYGEN MASK WILL FALL FROM THE CEILING

The Portégé also includes excellent, customizable power-management settings.



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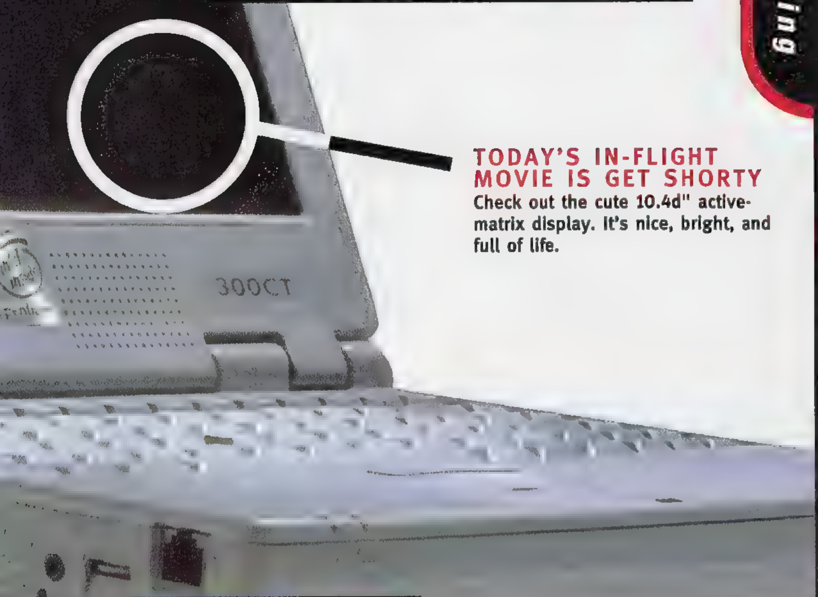


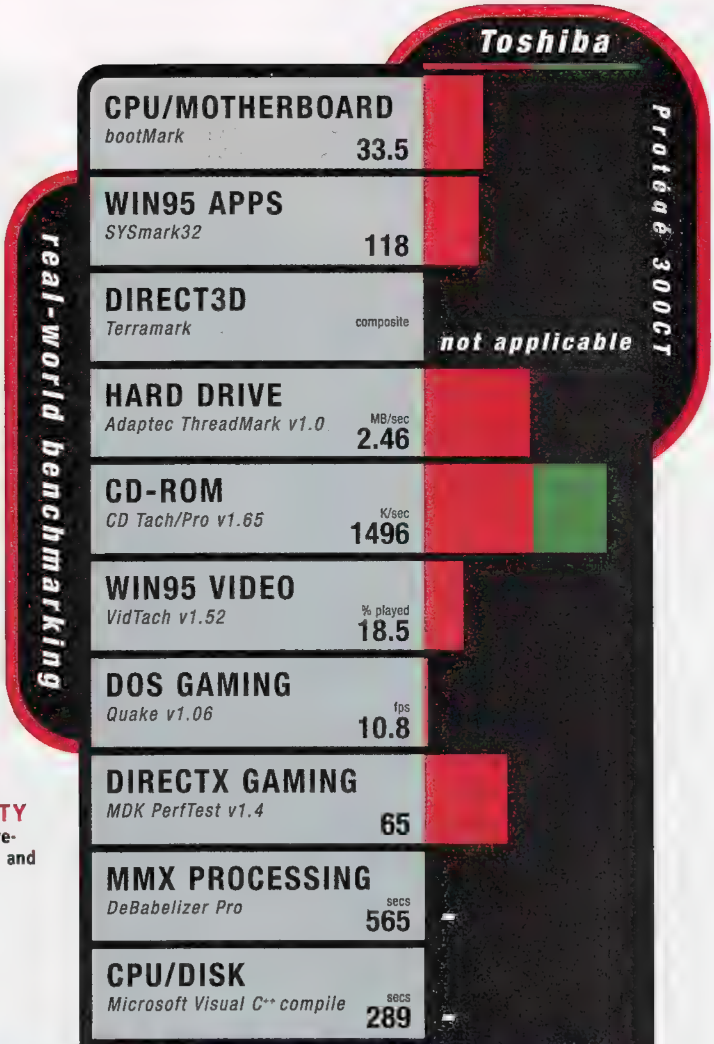
TODAY'S IN-FLIGHT MOVIE IS GET SHORTY

Check out the cute 10.4d" active-matrix display. It's nice, bright, and full of life.

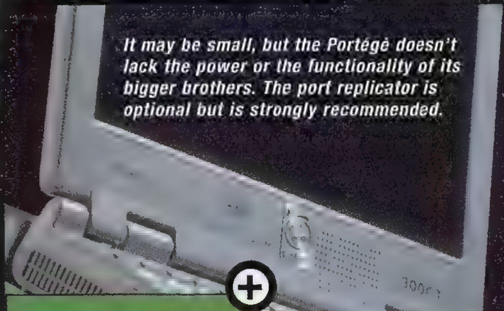
TOSHIBA
Toshiba

FOR DINNER YOU HAVE A CHOICE OF CHICKEN OR CHICKEN

Like other Toshiba notebooks, the Portégé includes a bunch of useless control panel applets. Our advice—turn 'em off!



Test	Benchmark	Unit	Toshiba Portégé 300CT
CPU/MOTHERBOARD	bootMark		33.5
WIN95 APPS	SYSmark32		118
DIRECT3D	Terramark	composite	not applicable
HARD DRIVE	Adaptec ThreadMark v1.0	MB/sec	2.46
CD-ROM	CD Tach/Pro v1.65	K/sec	1496
WIN95 VIDEO	VidTach v1.52	% played	18.5
DOS GAMING	Quake v1.06	fps	10.8
DIRECTX GAMING	MDK PerfTest v1.4		65
MMX PROCESSING	DeBabelizer Pro	secs	565
CPU/DISK	Microsoft Visual C++ compile	secs	289



It may be small, but the Portégé doesn't lack the power or the functionality of its bigger brothers. The port replicator is optional but is strongly recommended.

+

- Compact carrying weight
- Low-profile design
- Full-featured port replicator
- CD-ROM performance
- USB ports
- Wavetable audio
- Bright display
- Built-in modem

−

- Pentium 133MHz
- No integrated floppy drive
- No gameport
- Short battery life

Price *$3,499,*
$479 for port replicator
Company *Toshiba*
Phone *800.457.7777*
URL *www.toshiba.com*

boot verdict 8

A complete breakdown of benchmark results is available on the *bootNet.* Point your browser to www.bootnet.com

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Product Information Number 236

LIP continued from > 41

ton of stuff, but it's an architectural transition point and we have to lose some things to make the right steps in the future.

Hook Adding power suits into *Quake 2* took an hour and a half to get something we all agreed looked really good in hardware. Then to do the software version took four or five hours, even after the research was done on the OpenGL version. And the same with these translucent beams we do. OpenGL was "Boom, done!" Software, I had to go through and write new primitives. That took over a day.

St. John ***Bottom line, what should the next-generation 3D hardware accelerator be?***

Carmack It should be a 3Dfx with integrated 2D and video-IN. That's the concise definition of what future hardware should be. And there's a couple coming out now that fit that bill. The NVidia RIVA 128, the Rendition V2200 and, to a lesser degree, the PerMedia P2. They're all single-chip cards that basically use the same memory and provide most of the features. In the case of the Rendition, they provide everything. They provide a wider feature base than 3Dfx without some of the limitations on texture aspects and format sizes. And they also provide acceptable 2D video.

With all these pluses and minuses, I thought for sure there would be the clear winner by now. I remember thinking in January that in a couple of months the three survivors would be Voodoo Rush, the Verite V2200, and the PerMedia. It turned out that the PerMedia 1 had really bad visual fidelity. V2200 still hasn't shipped, delayed forever. And Voodoo Rush has limits, and they wound-up crippling some of the 3Dfx performance for architectural reasons. So they took a step forward and a step back.

*"If you're doing something **cutting edge**, you're making fundamental decisions about your architecture, and if you let it **slide** for a year or two, then it's just not the right **decision** anymore." –John Carmack*

St. John ***Is id going to have to start patenting its technologies to protect you from other people patenting things they use in their games?***

Carmack Well, we get to the idealistic thing. The only time I've ever had to actually put my foot down at id was over a patent.

St. John ***You asserted your authority?!?***

Carmack Yeah. The only time I have ever had to do that over other people's wishes was over software patents. Things were coming up about patenting things for protection, licensing, whatever, just for the reasons that lawyers give you. They were coming up and I said "No!" a bunch of times, and then they were being talked about when I wasn't there. And I delivered an ultimatum that said if id Software patents anything, they're going to be doing it without me because I will leave. And the fallout from that was *not* pretty. Everybody was pissed off at me, and I don't want to do that again. But that was something I felt strongly enough about that I, quite literally, would have left the company. I would've gone off and programmed on my mountaintop someplace.

St. John ***What if somebody patents the technology you want to use in* Trinity*?***

Carmack I really don't want to think about it. I'm sure eventually we'll get a demand letter from someone. I'll throw a lot of money at lawyers and say "Make this person go away," and we'll see how it goes. It's something that's really depressing because it's so horribly wrong for someone who's a creative engineering type to think about patenting a way of thinking. Even if you had something really, really clever, the idea that you're not going to allow someone else to follow that line of thought... *All* of science and technology is built standing on the shoulders of the people that come before you. Did Newton patent calculus and screw the hell out of the other guy working on it? It's just so wrong, but it's what the business world does to things, and certainly the world is controlled by business interests. And technical idealists are a minority, but it doesn't mean that I have to drag myself to do things that I don't consider right.

Hook It'll just be unfortunate when John comes up and says "Man, I came up with this really cool idea to do something, but some guy patented something that sounds sort of like this in a real general way, and we may not be able to use it." And what could've been the basis for a whole new completely cool architecture, and a new revolution in gaming is off limits.

Carmack Well, the argument is that we could always license it from them. That's what patents are supposed to protect.

St. John ***I know that's the specter raised by the whole* Messiah *controversy.***

Hook Dave Perry's comments would make sense if he were talking about copyrights. It's apparent that whoever's been educating him about this has not been doing a good job because the things he's talking about a patent protecting are not what a patent protects. He says, "We don't want people stealing our code." Well, copyrights protect you from that. It's important for the people at Shiny, or whoever else is doing software patents, to understand the difference between a software patent and the copyright because copyrights protect you in all the important ways that you really need to be protected.

We've even had people say "id shouldn't sue people for pirating your software because you're against software patents." That's a completely separate topic.

St. John ***If you could just hire anybody from the 3D world, who would you hire?***

Carmack Well there's a big difference between who I consider the most talented and who I would necessarily hire, because you have to hire people that fit right. If I had to pick who I think is just the most talented, it would probably be Ken Silverman, the guy that did the BUILD engine. He does engines *and* tools. He's great as an editor. He writes all the code for everything, and he's just extremely talented. I think it was 3D Realms' worst decisions not to coddle him, or whatever it took, to keep him on board. I think if he was still working directly for 3D Realms, they would have a *Quake*-type game shipped by now, just because he's extraordinarily good. There's maybe a half dozen people that are top-notch A-level 3D programmers. I'm not going to give you a list because I'd leave somebody off and they'd be all pissed off at me.

St. John ***You've already left off 90% of them by naming Ken Silverman.***

Carmack All the people doing things that people are talking about now are pretty talented. The Epic people have been working on it for a long time. They've gone through a big learning process, but they've got the issues under control and they're going to ship a product.

St. John ***So you think one day Tim Sweeney might grow to be as successful as you.***

Carmack It's hard to become successful by following in footsteps. This is probably going to come out sounding demeaning, but Epic wants *Unreal* to be *Quake*. Everything they did with *Unreal*, they did because they wanted it to be like what *Quake* turned out to be. And they're going to achieve a lot of that, because they're doing a lot of things well, but you're just never as big when you're second in line.

Hook Just like *Dark Forces* and *Duke* were both phenomenal games, they still definitely didn't have the impact of *Doom* simply because they just weren't first out the gate.

Carmack Like *Prey*, there's a lesson to be learned, something a lot of companies don't really ever learn. You hear it from the fan base a lot. "Do it right. We'll still be here. We'll wait," and it's tempting to just let things slip. But that's *really* not OK. If you're doing something cutting edge, you're making fundamental decisions about your architecture, and if you let it

I want my plush Shambler!

boot Have you guys thought of merchandising? We'd love a Shambler plush toy!

Carmack Merchandising is something id has just consistently fucked up. We've got this long track record of doing exactly the wrong thing with merchandising. Two or three different companies just totally dropped the ball with Doom. I forget where the rights went on Quake.

boot Whatever happened to Doom: The Movie?

Carmack It was optioned, picked up, a script was written, but it just lapsed. I guess the statistics are: 100 options for every 10 scripts for every one movie or whatever. If it happened that would've been fairly cool, but I never had my hopes up.

slide for a year or two, then it's just not the right decision anymore. Even if you pile on all these extras, it's not optimal. It's not targeted at what you're doing. So I have some concerns about *Prey* coming out this late.

Hook That's the other thing that differentiates the really good people and is sort of a pet peeve of mine. I have a problem with some of Dave Perry's attitudes, but he *has* shipped games, so he is someone to be taken seriously. It bothers me when someone solicits magazine covers 12 months before their game is going to ship. It's like, "Spend more time working on your game instead of hyping it." The ability to ship a game, you can't stress that enough. You know that Albert Einstein quote "Imagination is more important than knowledge." I don't believe that anymore. I think the ability to ship a product is far more important because someone who's not very creative can have little bouts of creativity, but someone who's not very productive doesn't have a bout of productivity and ship a product. You just have to grind it out.

> *"I delivered an ultimatum that said if id Software patents anything, they're going to be doing it without me because I will leave. And the fallout from that was* ***not*** *pretty. Everybody was pissed off." —John Carmack*

The problem is that it's a slippery slope. Everybody likes to make fun of *Battle Cruiser 3000 AD*—which I've never even seen—but it was like seven years late because they didn't know when to just say "Ship the damn thing!" No matter how creative you are, no matter how good you are, if your product takes three, four, five years to develop, you're not going to make back the money you spent on development.

These days, I'm a lot more jaded. You'll see *Next Generation* or *boot* coming out with a preview of a game that's 25% complete but it's got the most incredible screen shots. You look at it, and you look at the developer, and you're like "What have they done? Nothing." You can look at a laundry list of games that people talked about and never shipped, or by the time they came out, were absolutely irrelevant.

Carmack We've got a pretty consistent track record here. We go 50% over budget on schedules. With *Quake* we said "We're going to do it in 12 months," it took 18. It's pretty much the same thing back for *Doom* and *Wolf.* Michael Abrash and I once had a discussion kind of justifying ourselves. We said, "Well, if we shipped on time, we probably weren't ambitious enough."

Hook Games that were started in 1992 and took a really long time have shipped in the past six months and they still use fixed-point math. And fix-point math died with the 486. They said "Hey, why don't we use floating point?" Then later, it's, "No, we don't have time to go back and rewrite it." You choose your target platform and you architect your entire game around this concept, then the minute you slip you're going to be dated technology and you're not going to be appropriate for the vast majority of systems people are running.

Carmack That was one thing that *Quake* did really good on. We still hear people that use Cyrix and AMD processors saying, "You're just lazy for not doing fixed-point math." We saved time doing floating point. And on Intel processors it was actually the faster thing to do.

St. John Your plan files raise a lot of controversy on the Internet. Is this a good thing or a bad thing?

Carmack At the start, I put my daily work log up. I started disciplining myself, basically writing down what I'm doing so I can go back and say "You were a bum that day. You didn't get anything accomplished." It made me accountable to a million people. And I'm all for things that make me work better.

St. John What about Brian using it as a political forum?

Hook Oh, hold on, hold on! I use it for different reasons than John. I do it because I have this weird altruistic thing where I enjoy writing. I enjoy educating other people. Now I may not be the most qualified person in the world, but I'm somewhat qualified.

I don't believe too much in trade secrets. You tell people what you're doing, and if they're so good that by giving them that leg-up they're better than you, then you have to be that much better. We tell everybody how we're doing stuff, because we figure we're on the cutting edge.

But I also believe plan files are a way of venting when I just want to talk about something that irritates me. I enjoy doing that, and people say they enjoy it too, because it shows that people here are also human. And in the case of my racism accusations against *Shadow Warrior*, it takes a certain amount of cockiness and arrogance to take a stand on something, especially when you're in a high-profile position and I am in that kind of a position. I'd be remiss not to use that to correct something I feel is wrong. And in this case, it's personal for me since I am half Chinese.

The problem is, unless I write an epic novel explaining every little thing, people tell me "I hate whites." I've got mail from people who tell me I'm some liberal freak. They just extrapolate. It kind of takes away your incentive to do stuff like that.

I reserve the right to talk about personal stuff, and I *have* gone overboard, and I shouldn't have. When I slammed the guys at Epic, I was a little harsh on that one.

Carmack That one crossed the line for me. I really don't believe in attacking others. Still, it's kind of interesting. Ultimately, I think it's a good thing because it's unedited commentary straight from the person's mouth. There are usually too many layers of interpretation and spin between what somebody thinks and what people actually get.

St. John Still, it's frightening the amount of sway you hold.

Hook It really is. Sociology majors need to be seriously researching this. It's like MUDS with graphics. On some *Quake* servers, people aren't even killing each other. They're just sitting there talking. Even when I play on our local server, there'll be six people just stopped and talking.

St. John Don't you just run up and blow them away while they're chatting?

Hook But that's no fun!

Carmack Then they talk when they're dead!

Hook Oh exactly! That's the worst part.

St. John Last question: I'm kind of unemployed now. What career advice would you guys give me?

Hook If you worked for SGI and evangelized OpenGL and didn't lie through your teeth like you did with D3D, I think you would do a pretty good job.

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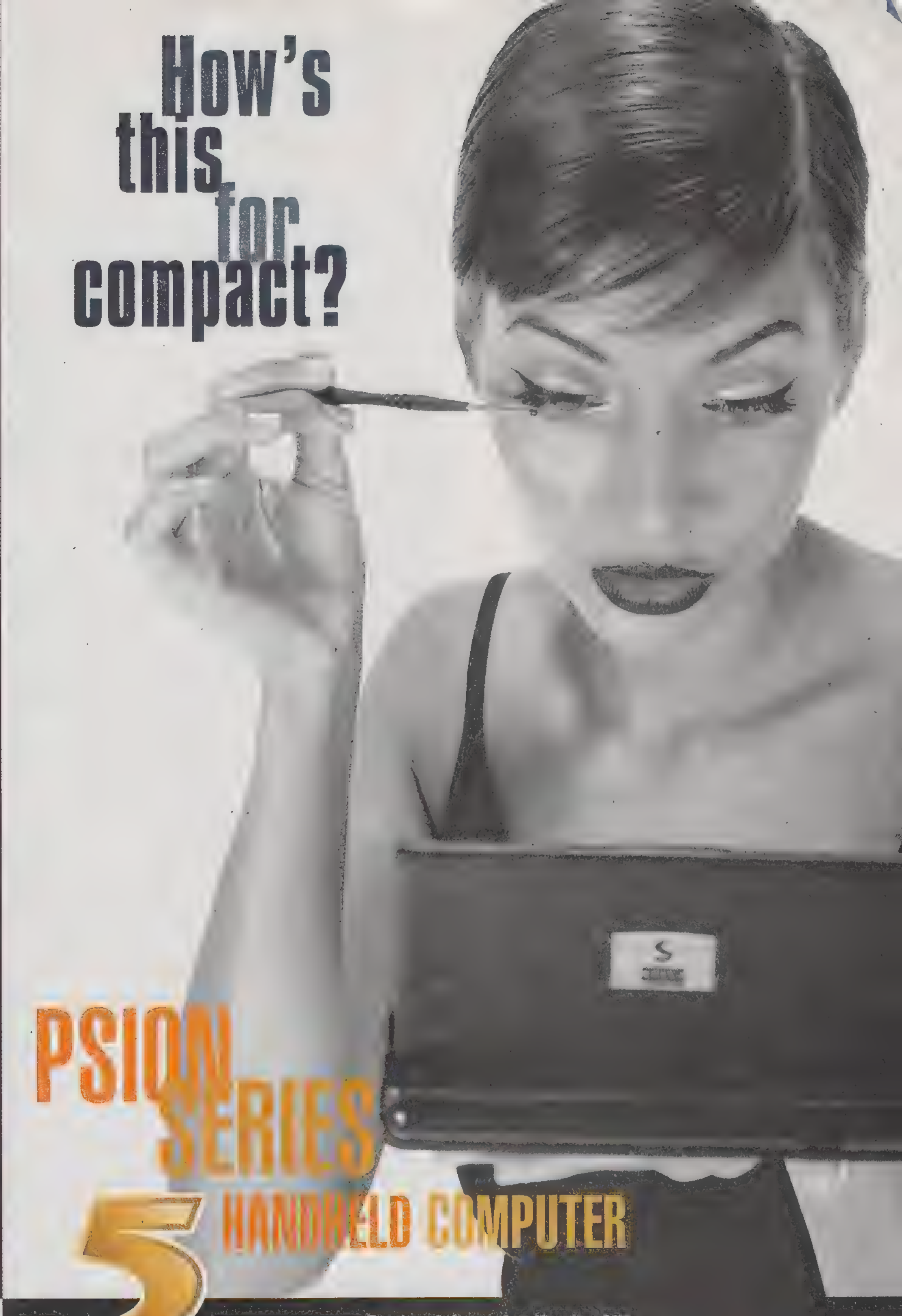

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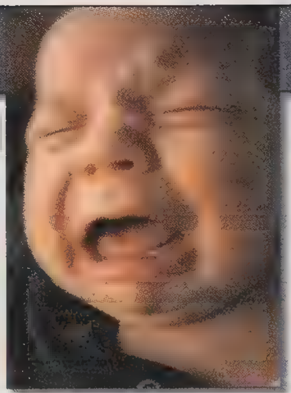

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ISSUE NUMBER 17
ON SALE DECEMBER 23, 1997

boot

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The DirectTex Files

Warren Wesley, a former Texas Implements insider, reveals the shocking turmoil that wracked the high-tech R&D juggernaut during the 1970s

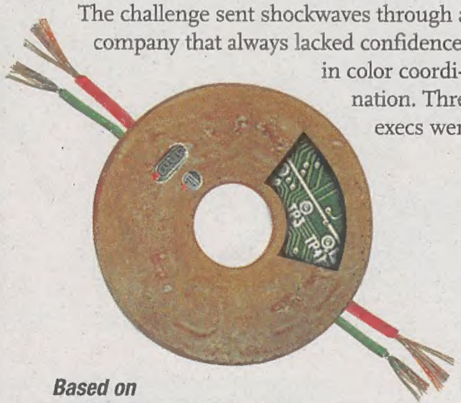
Pictured here in a photo culled from Texas Implements' "troublemakers" file, Warren Wesley (highlighted) edges and shimmies his way ever-closer to a really important event to which he has not been invited. Wesley would later be reprimanded for standing in the company of men with different-colored suits.

To the outside world, Texas Implements appeared to be all peaches and cream, but in 1972, amid the frenzy of integrated circuit development, our company was beset with treachery and confusion. That was the year we entered the consumer electronics market with the first handheld calculator, the SpivitySpoo 4000.

The Spipp, as the engineers affectionately called it, cost a mere $27,000 retail—a 75% price decrease from our mainframes of the day, and about 99.9% smaller. The unit could add, subtract, multiply and divide with reasonable accuracy. Sure, the decimal key didn't work, and an integer error reduced every calculation by either 1.75 or 17.5 depending on who was using the unit and whether the Spipp liked the person or not, but consumers were happy to finally discard their cumbersome adding machines. They forgave the bug, and factored the Spipp's calculations accordingly.

Folks were snapping up the Spipp in droves. This drove our mainframe guys mad with jealously. They sensed an imminent phase-out, and attempted to sabotage the project by questioning the color of the LED displays. "Why red?" they asked. "Why not green? Who says people don't like green?"

The challenge sent shockwaves through a company that always lacked confidence in color coordination. Three execs were sacked, and the head of R&D was forced to sign a document admitting he was insane. Three months and $3 million in research later, we came out with the SpivitySpoo 4100, a hapless failure that induced the shakes in all but the most sturdy users. We sold the entire stock to China—which likes the shakes—and proceeded forward, licking our wounds but all the wiser.



Based on confectioner's sugar instead of silicon, Texas Implements' original microprocessor design worked only in the dreams of romantic millionaires.

In 1973, we launched the natural successor to the Spipp, the Math Scab 5000. The Scabby's svelte $900 retail price was made possible by the smallest integrated circuit known to man, a little wafer of silicon that had to be placed in the calculator by little robotic tweezers. Unfortunately, our little robotic tweezer technology was years behind our integrated circuit technology, and many Scabbys left the assembly plant without chips inside. Thankfully, consumers forgave the bug, and factored the Scabby's calculations accordingly.

The ca-ca hit the fan in 1974 when the CEO's wife woke up from a dream in the middle of the night, and demanded that her husband disband the mainframe division. She said God had told her that the mainframe guys had a higher calling in life, and that a third of them should work in the cafeteria, another third should lead elementary school field trip tours, and another third should be humiliated on the town square and then fired. So the CEO moved to accommodate her, inadvertently prompting the Great Texas Implements Secessionist Movement of 1974.

You see, an obscure by-law of the Texas Implements corporate charter provides for the division of the company into 13 wholly independent entities in the event of irreconcilable dissent. To say the least, mutiny was afoot. More than half the company allied with the mainframe guys, mostly because everyone distrusted the mysterious integrated circuit guys who were prone to wear gabardine trousers and pork pie hats when the rest of society had moved on to double-knits and love beads. Alas, the Secessionist Movement lasted only a few days before the CEO exercised another obscure by-law of the corporate charter that allowed him to release anyone at any time for any reason he so desired. The mainframe division was eighty-sixed, and Texas Implements entered its hey-day of intense integrated circuitry development.

So that's the whole sordid story. At least that's what I overheard through the air vent one day. No one really liked to tell me much, me being a purchasing clerk and all. b

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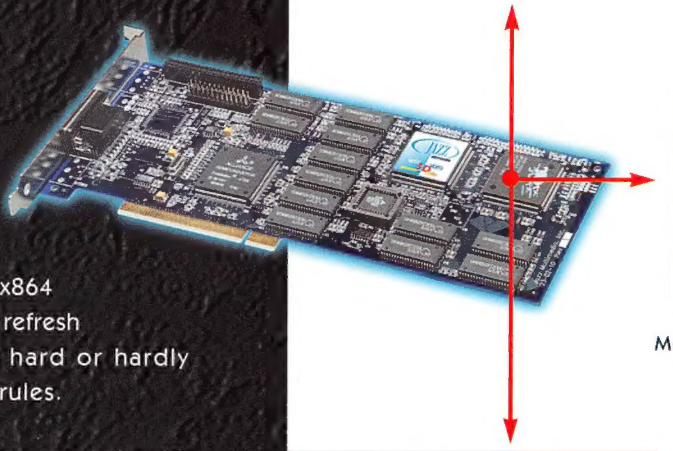

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November 1997

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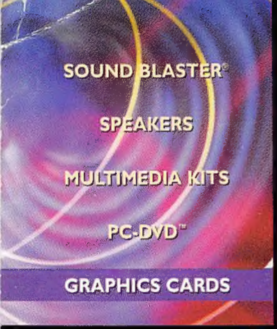

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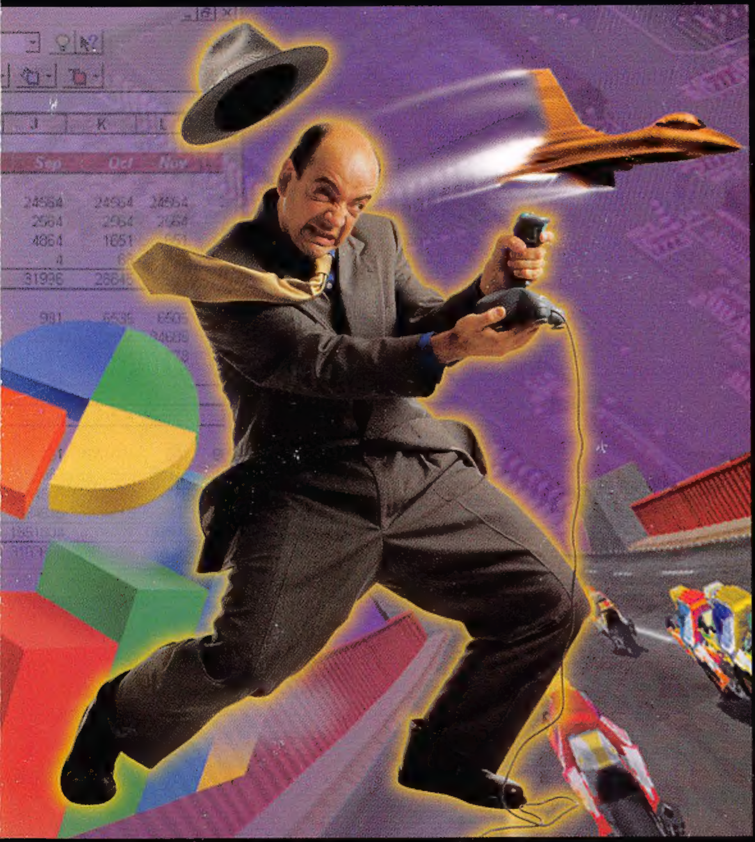

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